The Builder.

VOL. LII. No. 2204. SATURDAY, APRIL 2, 1887.

ILLUSTRATIONS.

Modern Ornamentation.—By Dr. Chr. Dresser 502
A Sketch in Siena.—By Mr. Reginald Barratt 503
Church of SS. George and Mary, Beckenham.—Mr. W. G. Bartleet, Architect 506-507
Edinburgh Municipal Buildings Competition: Elevation to High-street, and Section through Grand Staircase and Courtyard.—Design by Messrs. J. A. Morris & Hunt 510-511
Elevation to Cockburn-street (Plans, p. 500) of Messrs. Morris & Hunt's Design for the Edinburgh Municipal Buildings Competition 514-515

CONTENTS.

Mycenæ Vases 491
"Modern Ornamentation" 492
Notes 493
Letter from Paris 494
Archæological Discoveries in Morocco 495
Royal Institute of British Architects 495
Elections of District Surveyors 497
Notes from Sweden 498
Builders' Clerks' Benevolent Institution: Annual Dinner 498
Artisans' Dwellings near Grosvenor-square 498
The "Builder" Sign 499
Competitions 499
Modern Ornament.—By Dr. Dresser 499
Doorway, Palazzo Tolomei, Siena 499
St. George's Church, Beckenham 499
Edinburgh Municipal Buildings Competition 499
Further Notes on Fairfax House, Putney 517
Lectures at Carpenters' Hall: Bricks and Brickwork 518
Architectural Societies 519
Case under the Metropolis Management and Building Acts, 1882 520
"A Book on Timber Wanted" 520
Kitchen Boiler Explosions and Safety Valves 520
Provincial News 521
Church Building News 521
The Student's Column: Field Work and Instruments.—XIV. 521
The Marlborough Gra'e 523
Stained Glass 523
Recent Patents 523
Recent Sales of Property 523
Meetings 523
Miscellanea 524
Prices Current of Building Materials 525

"*Mycenæ Vases.*"

WHEN in 1879 the "Mykenische Thongefässe" appeared, it was well known that the book, important though it was, was only an instalment of a larger work. The illustrations were strictly confined to such vases as had actually been found in the graves of the Mycenæ acropolis, and could therefore, in the strictest sense, from their provenance, be called Mycenæan. The joint authors of the present book* see their way to much larger issues; from localities as far apart as Athens, Syracuse, Corneto, and Phocis they have collected specimens of a kind of pottery analogous to that found at Mycenæ, and in the belief that the head centre of fabrication was Mycenæ, they have given to this scattered material the name of Mycenæan,—in fact, they have added a fresh chapter to the history of pre-Hellenic fictile art. The work of classifying these materials was begun in 1878, just when the excitement of Dr. Schliemann's Mycenæ discoveries was at its height. Public interest centred, however, almost entirely on the more costly objects found, the ivory, gold, and other metals; the mountains of broken pottery were comparatively neglected: and yet, as Dr. Furtwängler points out, as regards chronology, these vase fragments were of supreme importance. The gold objects were found in some only of the graves, pottery in all. Further, analogous pottery had been discovered elsewhere, so that materials for comparison were at hand.

The amount of material was colossal. The whole of the contents of the graves were brought to Athens, as well as all the most important fragments from outside the graves. A small mountain of broken bits still remains to be observed. The method of classification adopted was simply this: the whole of the fragments were first divided into two great classes, according to the technical procedure of the decoration. In Class I. the decoration is dull (Mattmalerei), in Class II. it is glazed. Class I. is much the smaller of the two. It falls itself into two groups: *a*, red-clayed vases; *b*, pale clay vases. At Mycenæ Class I. only appears in the lowest strata of graves, so at Thera and Tiryns. At Nauplia it does not appear at all. It is sparsely represented at Ægina, Orchomenos, Daulis, Amorgos, and Melos. Most authorities agree that this class of vases, with the Mattmalerei, is a development of the rudest kind found in the Cyprus graves. On this it shows a distinct advance, as it bears evidence of the use of the potter's wheel, and painting is employed for decoration in place of rude plastic ornamentation, stuck on, and scratched lines. Whereas the pottery of the kind described in Class I. is common to Phœnicia, Egypt, and other Oriental races, Class II., with the glazed decoration, is distinctively Hellenic, only Greeks and those who learned from the Greeks manufacturing it.

Drs. Furtwängler and Loeschke then proceed to divide Class II. into four groups, according to the character of the decoration employed. Into these minutiæ of classification we need not follow them. It is more important to note their views as to the origin of this "Mycenæ" pottery generally, and its precise place in the history of Greek art.

To begin with the question of where all this widely-scattered pottery was made. They state without hesitation that, spite of all minor distinctions, the general character of the work is so uniform that they are obliged to suppose a common *fabrique*. The difference between *e.g.* the vases of Mycenæ and Ialysos is no greater than that between Attic vases found in Attica and those found in the Crimea. Hence the conclusion obviously is that most of the places where these "Mycenæ" vases are found imported them. The import does not seem to have been contemporaneous, *e.g.* there is evidence to show it began earlier at Thera than at Ialysos. They also think it probable that at the place where the head manufacture was there may have been several workshops, each characterised by differences of manner, just as in the days of Attic pottery we have the different styles of different potters, who each set their several fashions.

Further, in accounting for different styles, the variable taste of purchasers had to be considered; *e.g.*, it seems that by preference the Cyprians bought large kraters ornamented with chariot scenes, and wine jars decorated with concentric circles to imitate the grain of wood.

The head place of manufacture they hold to be undoubtedly Mycenæ, because there, and there only, have we an uninterrupted sequence of the different styles in their chronological development. At Mycenæ, further, we never find vases which have the appearance, as some have at Thera, Orchomenos, Cyprus, and other places, of being local imitations. Probably the manufacture took place all over the district of Mycenæ, but as the mature character of the ornament shows, the influence of the sea-coast must have been very strong.

Technique and systems of decoration alike show that the manufacture was in the main free from admixture of foreign influence. Naturalistic ornament prevails. Among favourite motives are patterns suggested by sea-waves, fishes, starfish, polypi, coral, sea snails, mussel-shells. Sea shells were, no doubt, worn for ornament by the makers of the vases themselves, and they transferred this simple system of decoration to their pottery.

Further, it is noteworthy that, whereas the gold ornaments, ivory, and the like begin to show evidence of foreign influence, the pottery remains true to itself, deep-rooted in local tradition. It enlarged its sphere of decoration by admitting the quadruped world, birds and men, and later by copying textile fabrics, but in all the long series of Mycenæ vases one never meets an Oriental hybrid monster, a griffin, or a lion, or even an Oriental vegetable motive, till the time when the Mycenæ style of pottery is all but extinct.

Still also essentially autochthonous as to motives of decoration in form and technique, the Mycenæ pottery came to borrow much from metal-work, and in this respect the comparison of the pottery and the gold work is highly instructive.

We come next to the important and difficult question of date.

First, we are obliged to own that, unless the whole of the pottery was imported from some locality unknown, it is pre-Doric in character. In order, however, to get some sort of definition into this vague chronology, it is necessary to consider the relation between the "Mycenæ" pottery and the pottery known as "Dipylon."

The dome-shaped building at Nicuidi was definitely closed when the third style of the second class of Mycenæ vases came into vogue. In the dromos we find pure fragments, which give evidence of a long-continued cult of the dead lasting on through the succession of several styles of vases, *e.g.*, Mycenæ third style, Dipylon vases, proto-Corinthian, Corinthian, and Attic; these are clearly successive, though, of course, in part they overlap. Also, in the dromos of the dome-shaped building near the Lion Gate we find fragments of the third Mycenæ style mixed with Dipylon fragments, whereas no fragments of the fourth style are certain here. So also at Tiryns the third and fourth styles are weak, the Dipylon strong.

The conclusion is manifest; the third style immediately precedes, the fourth style is contemporary with, the Dipylon vases.

As regards the Dipylon vases, their full-blown appearance has always been difficult of explanation; there is no evidence of long apprenticeship to the art; the manner seems from the

✠

* Mykenische Vasen, Vorhellenische Thongefässe aus dem Gebiete des Mittelmeers. Im. Auftrage des Kaiserlichen Deutschen Archäologischen Instituts in Athen. Herausgegeben von Adolf Furtwängler und Georg Loeschke.

first well assured,—we can have no development.

An interesting hypothesis to account for this is offered by the two authors. During the third Mycenæ style, *i.e.*, about the tenth century, there was, in all probability, an incursus of a Doric stock, who had recently attained to the "Bronze" stage of civilisation, and whose chief industry, except graving on metal, was weaving highly-conventionalised and developed patterns. This Doric stock learned from the Achaians of Argos to make pottery with the wheel, and they then, having acquired the potter's art, introduced their textile patterns into the system of vase decoration, specially the notable so-called "triglyph and metope" pattern. These patterns were, in part, taken over into the third Mycenæ style, and a few motives from the Mycenæ style were borrowed by the Doric makers of Dipylon vases.

Whether the first Dipylon vases were made in Argos remains an open question. Be this as it may, the great mass of the Dipylon vases were made at a further stage in the Doric wandering,—possibly, as is suggested by the motives of the sea fight and Pyrrhic dance,—at Crete.

We have thus arrived at a terminus *ad quem* for the Mycenæ vases. We have now to look for a terminus *a quo*. Here Egypt comes in to help. It has recently been made almost certain, by a process of reasoning we cannot here detail, that the Mycenæ sword-blades date about the time of the first Rameseids (about the sixteenth century). On the wall of a tomb of Rameses III. a vase is painted, which was evidently done from an original of the third Mycenæ style. We must suppose, then, that as the Mycenæ style was then in a late period of development the early specimens must be as early as the fourteenth century.

The peculiar merit, then, of this Mycenæ pottery is to give evidence of a *pre*-Doric civilisation and a *pre*-Doric art, a time when the Greek people were as yet untouched by Oriental impulse,—when their desires were indeed narrow, but prompted by that love of naturalism which was the mainspring of all that was ultimately best in Greek art.

The gold and ivory objects found in the graves show us this same people, but under foreign influence in direct relation by trade with all the wonder world of the East. But Greek art remained true to itself, and we are able still to feel the autochthonic impulse of naturalism, even where the technique is foreign. In the wide spread of exports from Mycenæ two places hold a position of special interest,—Rhodes and Attica. In each of these places not only is there a whole necropolis full of Mycenæ wares, but the very form of the graves and the manner of burial shows that the influence of Mycenæ was stronger here than that of mere trade: a colony must have been founded. Presumably this took place under external Doric pressure in the mother city of Mycenæ. With this, literary notices agree, and the fact that the name Ἀχαια is found in Rhodes.

After the Dorian invasion, Greece a second time went to the East to learn, and again, but this time with more lasting results, she incorporated Oriental elements into her own naturalistic art.

It cannot be doubted that between Achæan and post-Dorian art there is a gulf caused by some great ethno-political upheaval, but a few scattered links can be picked up to cross the breach, and such are the continuance of the glazed pottery, certain peculiarities in gem engraving, and some few ornaments and figured types. In conclusion, it is well said that if Dipœnus and Scyllis came, as tradition has it, from Crete to Argos and Sicyon, they, the sons of Dædalus, came back to their old home and brought the arts of cutting, carving, and inlaying to the place where centuries ago they had been known, *i.e.* to this country of Mycenæ. The history of Greek art and of all Greece begins in the Peloponnese, and "the first chapter of that history is the story of the 'Mycenæ Vases.'"

We have given the theory of the book in some detail, both because the work from its great size and cost is not easily accessible except in the largest libraries, and also because its importance in regard to the subject with which it deals can scarcely be over-rated. For the detailed support of the theory, which can only be rightly understood by constant reference to the splendid and accurate plates, we must refer our readers to the original.

"MODERN ORNAMENTATION."

THIS is the somewhat too comprehensive title given to what is really a collection of fifty plates of decorative design published by Dr. Dresser,* and which is described in the preface as being "all original designs which are the work of the author, his assistants, and his pupils collectively." It is a proof of the degree in which Dr. Dresser has really created an atelier of design, that these plates produce the impression of being all by the same hand and devised by the same mind, in spite of the admitted fact that they are not so. The title of the work is badly chosen; it is, of course, difficult to select a distinctive title for a work of this kind; but "Modern Ornamentation" is a title which certainly conveys the idea of a comprehensive work giving illustrations of all the various schools or manners of modern decorative design, rather than of a limited collection of designs put forth from a single studio. "Examples of Ornamentation," or "Suggestions in Decorative Design," would have been a title more correctly conveying the nature and object of the publication, which consists of fifty plates of designs founded on ancient types or on nature, or in a few instances distinctly original, that is, having no special precedent that can be pointed out.

The latter title would, in fact, have precisely tallied with what the author says in his preface as to the object of the publication: "However creative our minds may be, we are all glad to have the thoughts of others brought before us for our consideration, and by contemplating strange works, and, if I may so express myself, re-digesting them, we often originate things differing widely from what gave rise to the thought, and imbued with all the special characters of our own minds. In this way it is hoped the present work may be found useful."

This reflection as to the suggestiveness of any ornamental idea for the working out from it of fresh combinations, sometimes differing entirely from what first suggested them, is one entirely borne out by the experience of every designer. A mere subsidiary incident, the manner of turning a scroll or of filling up a corner in a design, may catch a new eye and give rise to the development of an entirely new idea. This is one of the forms of similarity between music and ornament; purely instrumental music being, in regard to its forms, a kind of pattern-designing in sound in accordance with certain proportions and principles; and thus, as in some well-known instances, a slight incident in sound,—a series of rhythmically repeated knocks at a door, or a turn in the song of a bird, has furnished a great musical designer with the suggestion for an extended and highly elaborated composition.

These plates, then, are to be regarded as abstract ideas in ornament, not designed for any special place, process, or material, but simply as ornaments which may be adapted wholesale, if the manufacturer have absolutely no ideas of his own, or may furnish starting points and suggestions to be developed by each worker in his own way, and in reference to the material in which he is working. Taking them first as abstract ideas in ornament, without reference to material, we remember that when the first two out of the ten parts were sent to us some time ago, we were not favourably impressed with them as examples of the kind of thing of which the work was presumably to consist. The design on Plate III. especially, with dummy suggestions of birds with rosette eyes, and which we observe is noted in the preface as a kind of thing that would make a grotesque border for the dado of a smoking-room, repelled us notably; it looks more like a joke than a piece of real decorative design; and unfortunately it is a joke of which the humour is not very apparent. Some other designs in the book are open to the same objection; they are not only jokes, but rather poor jokes. The designs described as Celtic,—*i.e.*, based on Celtic motives,—show some of the oddity of that ancient and venerable school of ornament, but without its power and picturesqueness. Then, again, we have great doubts as to the system of trying to make ornament express a definite meaning, which Dr. Dresser has tried a good while ago on other occasions. Ornament which is imbued with definite meanings has unfortunately a great tendency to cease to be ornament. It certainly has ceased to be so in the "Evening" panel on plate 26, which is a mere kind of *olla podrida* of beetles, moths, and spiders, with a substructure of vegetation. We protest, "in the name of all the gods at once," against this kind of thing being regarded as decorative design. It appears to us inherently vicious.

There are, however, a considerable number of the plates which keep quite clear of these kind of "notions," and which, taken collectively, do present a large body of suggestions, many of them very good ones, for the filling-in of spaces and the devising and combining of diapers; and many of these, which are professedly based on known styles, are of value in another way, as suggesting the variations which may be played on the elements of those styles. There are not, we confess, many that appear to us to rise to the highest type of ornament; and we are rather inclined to think that this is an indication that it is a somewhat dangerous thing to put out ornament in the abstract, as specially invented and showing novelty either of idea or treatment. For there is then an almost irresistible temptation to the designer to, as it were, exhibit his cleverness; and cleverness is the note of these designs. There is a kind of *chic* about too many of them; a want of real feeling; a too-evident intention to make something clever; an intention which is realised, be it said; but then cleverness is not all we want in original ornament. Some of the designs display a larger and broader style than this, and a finer feeling; notably, the one we have selected for illustration (see lithograph plate in this number), and which is described as "a form of Italian Renaissance ornament." A great deal of the detail in this, however, is treated in a way quite new, and there is a largeness and breadth about it, a kind of enthusiasm in the design, which is very striking.

We alluded just now, in passing, to the idea that the craftsman might apply these designs, or suggestions from them, modified according to his own taste or to the material in which he worked. In regard to the latter point, however, few of the designs appear to be evolved with reference to the capabilities of any special material. A few of them are mentioned in the preface as suitable for execution in this or that material, but we hardly discern any decisive or necessary suitability, certainly not any of that inherent feeling for the material which is so important an element in decorative design. It is not sufficient, from our point of view, to say such a design may be suitable for stone carving; to be properly suitable it should have that sort of stone character in it, as if the idea of its working in stone were present to the mind of the designer from the first. The author may say he did not profess to publish designs for special materials, but only general motives. Our idea is that the motive itself should be partly governed by the consideration of the material in which it is to be worked.

* Modern Ornamentation; being a series of original designs for the patterns of textile fabrics, for the ornamentation of manufactures in wood, metal, pottery, &c., also for the decoration of walls and ceilings and other flat surfaces. By Christopher Dresser, Ph.D., &c. London: B. T. Batsford. 1886.

St. Pancras Workhouse.—The Local Government Board have approved of the plans of Mr. H. H. Bridgman, submitted by the Guardians of St. Pancras for the reconstruction of the remainder of the workhouse, at an estimated cost of 50,700*l.*

NOTES.

THE House of Lords disposed of the first twenty-three clauses of the Railway Bill in two or three hours on Tuesday, but not without adopting several rather important amendments. They agreed to a proposal made by the Earl of Jersey for altering the constitution of the new Commission by appointing two Commissioners instead of three, with a Judge of the Supreme Court presiding on all occasions. A certain amount of indifference was manifested on the subject, for, although Lord Stanley contended that the clause as it stood would meet all the requirements of the trading community, and Lord Salisbury complained that the judges were already overworked, no division was taken. An addition to Clause 12 provides that the Commissioners shall not award damages in respect of any matter arising more than a year before the complaint was made,—a limitation greatly affecting the scope of this clause. Clause 17 provides that appeal shall lie upon questions of law from the Commissioners to the Court of Appeal, and from thence by special leave to the House of Lords. The traders look upon this double appeal with great aversion, but Lord Grimthorpe, supported by Lord Bramwell, proposed to add to the yoke by permitting appeal upon questions of fact also; and the amendment was only defeated by two votes. Lord Bramwell (who was probably the author of the *Times* letter signed "B.") had made a very unusual proposition in the House of Lords on Monday with regard to this measure. His Lordship urged that the South-Eastern Railway Company might be heard by counsel at the bar of the House in opposition to those parts of the Bill interfering with their existing Parliamentary powers; and unintentionally created much laughter by gravely alluding to the company mentioned as "my clients." This motion was, of course, negatived, as every opportunity will be afforded for the measure to be discussed in Parliament in all its bearings in the ordinary course before it becomes law, and Lord Stanley has met the various deputations which have waited upon him on the subject with answers very much to this effect. It will be seen that the most important clauses of the Bill have not yet been reached.

THE result of the *plébiscite* on the Edinburgh Municipal Buildings Bill is an adverse vote of 13,426, and intimation has accordingly been given to withdraw the Bill. This result is only what might have been expected. The resort to a vote of the ratepayers in a matter involving additional taxation is not likely to be successful, unless in exceptional cases, where the individual wants of the voters is concerned. In the present instance those opposed to the scheme have been unscrupulous in circulating statements of the most mendacious kind, and in imputing motives where none existed. The resort to post-card voting was an entire mistake, into which the Town Council allowed themselves to be forced by avowed opponents to the scheme, who will doubtless rejoice at the result of their tactics, but it is a poor matter to be proud of. Something, it is clear, must be done, but the less done at present the better: it should only be in the nature of a temporary makeshift, leaving to a future time the carrying out of an efficient scheme. It is exceedingly unfair to the architectural profession that they should have been deluded into spending so much time and thought on a competition for a building, the erection of which seems to have been all along a more than doubtful matter. Why was not the *plébiscite* taken before designs were asked for, instead of after? The whole procedure in the matter has been most vexatious and unbusinesslike, and the architectural profession have really been made fools of in being drawn in to compete for a castle in the air.

A PRETTY long and rather acriminous discussion took place in the House on Thursday last week, on what was called the Kensington Vestry Bill, which was to empower the Vestry to erect a Refuse Destructor on a site in their parish. The Bill was read a third time, but as a strong opposition was made to it on the ground that the destructor would be a nuisance, we made some special inquiries as to Whitechapel and the destructor there, which was referred to as a case in point. We are informed that the destructor there is to some extent regarded as a nuisance in consequence of the deposit which it makes of a small, fine ash from burnt paper, which, being very light, is carried up the flue by the strong draught before it is entirely consumed, and falls in a powder around the neighbourhood. It has been suggested that the mischief might be remedied or avoided by the application of a small subsidiary furnace at the junction of the horizontal flue with the chimney-shaft. The nuisance appears to be, at all events, within the category of preventible ones, and not a sufficient drawback to cause the abandonment of destructors just yet.

RECENT falls of snow have brought into prominence several questions involving the extent of the duties of Vestries and Local Boards in the matter of the clearance of that wintry element. One or two important judicial decisions have been given on these points. According to a judgment delivered a few days ago by Mr. Justice Denman, it appears that local authorities are not liable for damages when an accident occurs in consequence of a vehicle being overturned by a frozen heap of snow left at the side of the street for a reasonable time after the fall. The successful defence was that snow must necessarily be heaped at the side of the street, and remain for some time, if the road is to be expeditiously made available for traffic, and that drivers, under these exceptional circumstances, ought to exercise increased care in driving through and turning the corners of streets, and so avoid the heaps of snow. The case came before the Court in proceedings instituted against the parish authorities of St. George's, Hanover-square; and the victory of the defendants will doubtless quietly dispose of the large crop of claims for damages which arose out of the previous fall of snow. Then the liability of Vestries to clear the snow from the footpaths round the enclosures in squares is also a matter of general dispute, and, in order to test the case, the Chief Commissioner of Police has, at the invitation of the Vestry of Chelsea, issued two summonses against that body for non-removal of snow from the footpaths described. The decision will be looked forward to with interest; for if judgment adverse to the local authority is given, it means that the first hundred men that can be got must be drafted away to perform the comparatively useless work of clearing these footpaths, and so hindering the more pressing work of clearance of the main roads and highways.

SHEFFIELD appears to be in the throes of an internecine quarrel about its water supply. It appears that the existing water company has within the last quarter of a century spent a couple of millions in providing that necessary article, though it has not been successful from a financial point of view, partly owing to the bursting of a huge dam in 1864, which caused an immense loss of life and property, and partly from the badness of the times, resulting in the shutting up and removal of various manufacturing concerns, and the consequent decline of the population. All this affected the company to such an extent, that the dividends fell from 5½, and even 7½, to 2½ per cent. One would have thought that a property, so confessedly in want of prosperity, would not have excited any jealous aspirants; but, curiously enough, the Sheffield Corporation has more than once sought to possess it, and on the present occasion is struggling in the House of Lords for powers to compel the water company to sell the waterworks to it. The object of the company is to obtain an extension of certain increased rates, which was granted for twenty-five years in 1864, and which would naturally soon expire. A great incubus upon the water company has always been the large compensation that it has had to allow mill-owners. At present, the drainage area is 15,200 acres, yielding about 19,000,000 gallons daily, of which 9,000,000 is charged for compensation. From the engineering evidence, it looks rather as if the Corporation would not be able to do any better for the town than the company has already been doing.

A MEMORIAL, signed by many influential personages, has been presented to the Secretary of State for War, praying that the public may be no longer shut out from the Tower Gardens and riverside Promenade. The signatories, being some 5,500 in number, comprise the Lord Mayor, with several aldermen, common councillors, magistrates, local authorities and medical officers, guardians of the poor, clergymen and ministers, chairmen of dock companies, &c. They represent how greatly such a boon would be appreciated by the inhabitants of the densely crowded districts around,—Aldgate, Whitechapel, St. George's-in-the-East, Limehouse, Poplar, and Wapping. The promenade, it appears, was open until the outbreak of the war with Russia in March, 1854, when it was reserved as a loading-place for service stores. Its pristine uses for that purpose are clearly apparent from an inspection of the Fleming Van Den Wyngaerde's map of London (*circa* 1550), of Aggas's map, and of Haiward's and Gascoigne's Survey of 1597. Stretching from the Iron Gate to the Tower stairs, near to the Thames subway, it lies between the river and the moat, or ditch, beneath the outer ballium wall. Since visitors are now admitted into the Tower between the hours of ten and four only, and most of the Ordnance warehouses have been recently pulled down, there seems to be small reason why this privilege should not be restored. The public are, as a rule, excluded from the precincts beyond Bell, Wakefield, and White Towers, and, indeed, from all portions of the fortress where its ancient military architecture can be best studied. There may be good objections against these restrictions being relaxed, yet the posting of warders or sentries at Byward and Cradle Towers, and by the new gate next eastwards of St. Thomas's Tower (over Traitor's Gate), would restrain the too curious from trespassing from the promenade into the forbidden ground. A portion of the gardens which overlook the moat, that has been dry ever since 1843, is divided into plots for cultivation by members of the garrison. The south-eastern slip, by the site of the older Galleyman (Develin), or Iron Gate Tower, was used for awhile (1829-1847) as a burial-ground, but has just been appropriated for the northern approach to the Tower Bridge, now in course of construction.

MISS OCTAVIA HILL, of 14, Nottingham-place, W., appeals for subscriptions in furtherance of a highly-deserving project. Having reasonable hope of certain funds in aid of the erection of six cottages, that lady is anxious to secure, by purchase, a certain plot of land adjacent to the cottages' site. The ground in question is situated in Red Cross-street, Southwark; being close to the old "Cross Bones" burial-ground, which is now occupied as a builder's yard. On this ground Miss Hill proposes to establish a people's hall, to be open in both summer and winter, for "music, flower shows, reading-room, and library . . . . and for concerts, lectures, parties," &c. The remainder of the ground would be laid out as a garden, and for this latter purpose a donation is forthcoming. The hall and land together will cost 2,500*l*.

A PUBLIC subscription has been set on foot for the purpose of restoring Preston Castle or Tower near Prestonpans, in East Lothian, N.B. Major-Gen. Sir Wm. Hamilton, the proprietor of the castle, has subscribed 50*l*., and the Marquis of Bute and Lord Wemyss are also among the donors to the fund. The

tower dates from the end of the fourteenth century, and is in a very dilapidated condition, having suffered at least three burnings,—once by Hertford in 1544, by Cromwell in 1650, and again by accident in 1663. It is now a mere roofless and windowless ruin, partly overgrown with vegetation, but is said to retain some features of interest, among which may be mentioned the dungeon in the basement, which is stated to be nearly perfect. The amount required for immediate purposes is estimated at about 350*l.*, which appears to be more than enough for merely repairing the building, which is all that should be done. It is stated, as an inducement to subscribe, that arrangements will be made in the future for the admission of subscribers and such of the public as desire to inspect the tower. Preston Castle is illustrated in the first volume of Messrs. MacGibbon & Ross's work on the "Castellated and Domestic Architecture of Scotland from the Twelfth to the Eighteenth century," p. 317.

BY the sudden collapse on Saturday afternoon last of the Occidental Tavern, in Fountain-court (Savoy-buildings), Strand, Mr. Terry, the actor, can boast that he "has brought down the house" at a very early stage of his enterprise. For here he is about to open, next autumn, the new theatre for which Mr. W. Emden's drawings were passed by the Metropolitan Board of Works in April, 1886. The chief entrance into the theatre will be at what was Bland's gun-shop, No. 106, Strand. The court is so called after a once famous tavern of that sign in the Strand,—its site now that of Simpson's divan and dining-rooms,—where used to meet the Fountain Club, as politically opposed to Walpole. In one of his letters Dennis, the critic, describes a meeting here whereat "after supper we drank Mr. Wycherley's health by the name of Captain Wycherley." Strype speaks of the "one very fine tavern which had the sign of the Fountain," with its good rooms and wine; as also of the "alley that leadeth to Fountain-court, a very handsome place with a freestone pavement, and good buildings, which are well inhabited." Lillie the perfumer's was known as being next door to the Fountain; thence he removed, after a fire, into the premises since familiar to us as the shop of the late M. Eugene Rimmel. The Occidental Tavern, at the rear, has for some time past formed a chosen haunt of players and their associates. It was popularly known, too, as the Coal Hole; and there, as Procter tells us, Charles Kean would enjoy a steak, though ill at ease amongst "the dress and ceremony and good behaviour incident to 'company.'" Ceremony, however, did not distinguish the gatherings for which in earlier days the Coal Hole was notorious under the presidency, or rather misrule, of the *soi-disant* Chief Baron Nicholson, together with the libidinous accompaniments of his judge and jury. These entertainments found a later home for a period, in the Cider Cellars, Maiden-lane, and in Leicester-square, on the eastern side. The ruin of the tavern, itself some 250 years old, and of the two houses next thereto, has fortunately spared an opposite house, being No. 3 in the court, where lived the painter of the "Ancient of Days" and the "Last Judgment," the author of the "Songs of Innocence and Experience."

THE paper recently read by Mr. Percy Fitzgerald at the Society of Arts, and published in their *Journal* of March 18th, on "scenic illusion and stage appliances," besides giving some information interesting to the many persons who have little idea how stage effects are worked, touches upon one or two points in regard to the principle of the matter which are open to consideration. Mr. Fitzgerald raises the question, for instance, whether too elaborate and realistic modelling of architectural details in a scene may not in one direction defeat its own end, by imparting a look of flatness to those portions of the scene which cannot be thus modelled, and must rely on illusory painting on a flat surface alone. Mr. Fitzgerald, again, questions the idea that the proscenium is the fourth side of the room, into which the audience look; he holds that the audience are in the position of an interested person on the stage, and that the fourth wall is behind them. In real life, such a spectator, he argues, does not see a complete room, but only a part of the room in which the action that interests him takes place, and on which his attention is concentrated. Therefore, the argument is, to put the spectator in the same position he needs not to be shown a *complete* room with one wall knocked away, but a portion of a room in which he is supposed (in a sense) to be. Mr. Fitzgerald is adverse to too complete a realism. He quotes Charles Lamb's dictum: "Not all that is optically possible to be seen is to be shown in every picture," and applies this as against the necessity of practicable doors. "By the old system the player went off or came on to the scene; that is, he passed, as it were, from the zone of action and merely disappeared at the wing." This reminds one of the delightful excuse for the want of stage doors made *per* Dr. Johnson's *Ghost* in "Rejected Addresses":—"Permanent stage doors we have none. That which is permanent cannot be removed, for, if removed, it soon ceases to be permanent." There was no realism in having the same door for the palace and the cottage. Mr. Fitzgerald's position, that no doors at all, and only a disappearance into the wings, is the arrangement best in harmony with the conditions of the drama, depends of course upon how much you choose to "make believe." The most realistic drama is make-believe to some extent; consistency is the main point. The modern domestic drama tends to be so very realistic in most senses that it seems to require the realism of doors to the rooms to keep up consistency. Dramas of more ideal kind may dispense with this kind of furniture, no doubt. There is one point in which, we may observe, realism is never successfully carried out on the stage,—architectural detail. It is nearly always bad, even in the most "regardless-of-expense" mountings of plays; the Gothic is poor weak stuff, and all sorts of vagaries are played with Classic detail: it may be realistic to the lay spectator, but it is not so to the architect.

THE monthly paper published under the title of *Scientific News*, with the rider "for general readers," of which two numbers have appeared, seems to answer well to its title, and to provide accurate information in a form intelligible to the non-scientific mind. Such a paper may do real service in bridging over the gulf between the scientific and the non-scientific public.

WE are glad to see, from the answer given by Mr. Ritchie to a question in the House on Monday night, that the Conservators of the Thames intend bringing house-boats under stricter sanitary regulations as to their discharges into the river, and that "any closet communicating with the river" will be an infraction of their proposed by-law. This is a step in the right direction, at all events.

THE report in the last week's number of *Nature* of Captain Abney's exceedingly interesting Friday evening lecture at the Royal Institution on "Sunlight Colours," should be read by every one who is desirous to assist his scientific perception in regard to the causes and meanings of variations of tone and colour under different conditions of sunlight and atmosphere. Landscape-painters, who are often too prone to slight the researches and opinions of the scientific student of nature, ought to find something to set them thinking in this lecture. One sentence in it, by the way, opens up far-reaching conjectures as to the possibly different ways in which different persons (painters included) see nature. Captain Abney says, after describing some of his ingeniously-contrived tests for colour perception, "We have tested several eminent artists in this manner, and about one half the number have been proved to see only three-quarters of the amount of red which we see. It might be thought that this would vitiate their powers of matching colour, but it is not so. They paint what they see, and though they see less red in a subject, they see the same deficiency in their pigments; hence they are correct. If totally deficient, the case of course would be different." One question that suggests itself after this is, What is "correctness" in such a case? Probably we all see nature (and pictures) differently.

LETTER FROM PARIS.

ON Saturday night the Hôtel de Ville, blazing with electric light, will receive for the second time the guests of the Municipality; but in spite of the fifteen years that have elapsed since the commencement of the works, it is still necessary to hide by a *velum* the scaffolding of the Salle des Fêtes; the empty niches are waiting for statues, and the decorators have completed the framework only for the historical paintings which the City Council have not yet persuaded themselves to commission.

A step, however, has been made in this direction. After two long discussions, the Council, much divided between the principle of direct commissions and that of public competition, have at last decided on a middle course which is to satisfy all parties. A mixed committee of thirty members is to prepare a programme to be submitted to the Council. The committee will include the architects of the Hôtel de Ville (MM. de Perthes and Formigé), the members of the Fine Arts Committee of the Municipality, twelve Town Councillors, and twelve members chosen by the Council for their special fitness. This committee will draw up a scheme of subjects and places for decoration, to be summarised under two groups, one for direct commissions and the other for open competition. "All's well that ends well," for we have now a committee practically composed of experts, instead of one purely political, and perhaps some part of the immense scheme of intended decoration may now be accomplished by 1889.

There is not much new to say about the Exhibition work this month: the work is going on, rather slowly it is true, partly kept back by the recent inclement weather. It is now settled that the special exhibition of Algeria will be placed along the Quai d'Orsay, on the right of the Esplanade des Invalides. The naval and military exhibitions will be situated opposite, on the left. Behind Algeria will be raised the pavilion of Tunis. It has been decided that the Exhibition is to be kept open, lighted by electric light, till eleven each night; and M. Paul Sédille has been appointed "chef du service" of the French and foreign installations for the Exhibition.

The Municipal Administration intends to take an important part in the Exhibition. It will occupy a site of 3,000 square mètres on the terrace of the Champ de Mars, opposite the exhibition of the Beaux Arts. Its pavilion, surrounded by gardens peopled with a crowd of statues, will contain the documents and *matériel* of a number of public services. The total cost of this special exhibition will be about 600,000 francs, without counting the cost of the buildings themselves.

The last day of March was the last for receiving works for the *Salon*, which will include 2,500 pictures and 800 drawings. In the interim, before the *Salon* opens its doors, there is erected opposite the Palais d'Industrie the statue which is to be raised in Algeria to the memory of Sergeant Blandan, who died in 1842, after greatly distinguishing himself in the combat at Beni-mered. The statue is the work of M. Chas. Gauthier.

The *Salon* this year will have a special interest owing to the paintings of military subjects, commissioned from various artists by General Boulanger, and also by the presence of some of the paintings which are to decorate the new Sorbonne. Among these the most important is the cartoon of an immense composition by M. Puvis de Chavannes, 26 mètres in length by 6 mètres high,* symbolising the ancient Sorbonne, and Eloquence recounting the Struggles and Triumphs of the Human Intellect. This main work, intended for the large amphitheatre, is to be accompanied by two subsidiary panels representing Philosophy, History, Botany, Mineralogy, Geology, and the Muses (!).

* *I.e.*, about 85 ft. long by nearly 20 ft. high. How would the Hanging Committee at the Royal Academy greet an artist who offered them a picture of those dimensions?—ED.

The cupola of the amphitheatre will be ornamented with allegorical paintings by M. Galland.

MM. Flameng and Chartran, on their part, are preparing for the grand staircase of the Sorbonne two vast allegorical compositions, representing, one the records of French Literature, the other the records of Science. M. Flameng, who is to figure in the *Salon*, represents Abélard and his class of philosophy, with a view of ancient Paris in the distance. M. Benjamin Constant is also commissioned, for the Salle du Conseil Académique, to execute five large panels, of which the principal one is to represent the present rector, M. Gréard, surrounded by the Deans and representatives of all the Faculties. In one of the Salons de Reception, a painting by M. Winckler will represent the laying of the foundation-stone of the Sorbonne. In one of the committee-rooms M. Lhermitte is to have two panels, one representing St. Claire Deville discovering aluminium, the other Claude Bernard lecturing on anatomy. M. Jobbé Duval is to paint for the "Salle des Actes" of the Faculty of Science the subject of "Science presiding over Modern Discovery"; and M. Olivier Merson is to paint, in the Rector's room, allegorical representations of the Sixteen Provincial Academies. Other painters who are to be employed in decorating other apartments of the building are M. Clairin, M. Roll, M. Cazin, and M. Lerolle.

Out of 150 students who have applied to enter "en loge" for the Prix de Rome, the École des Beaux Arts has selected ten, whose names we give in order of classification:—

M. Tournaire,	pupil of	M. André.
M. Chédanne	,,	M. Guadet.
M. Lafon	,,	M. André.
M. Bertone	,,	M. Ginain.
M. Sortais	,,	MM. Daumet and Girard.
M. Eustache	,,	M. Ginain.
M. Gustave Consin	,,	MM. Coquard and Gerhardt.
M. Heubes	,,	M. Pascal.
M. Raphel	,,	M. Raulin.
M. Conil-Lacoste	,,	M. Ginain.

M. Daumet has been commissioned to propose the programme of the deciding competition, of which the subject is "a Gymnasium."

Another very important competition to take place shortly will, no doubt, give ample employment to French architects,—that for the monument of the French Revolution, which has found a determined supporter in M. Berthelot, the new Minister of Arts.

Adieu to the grand projects for the "emplacement" of the Tuileries; adieu to the idea of the splendid palace which was to unite the Chamber of Deputies and the Senate House in one building, in the heart of the city, and in close proximity to all the ministerial offices. All these plans are abandoned, and M. Charles Garnier has been obliged to give up his own views, for it is just on this site that it is proposed to erect this said monument, which may either be purely symbolical, or may be composed of various edifices united by monumental façades or porticos, and containing the statues and bas-reliefs relating to the history of that turbulent epoch. The precise scheme is not yet made known, but the vote asked for is twelve million francs, and 50,000 francs will be given in premiums in the competition.

The tomb of Berlioz, in the Montmartre Cemetery, is to be inaugurated. This funeral monument, the work of the architect Jouvin, is of great simplicity and of fine character. Above a tombstone in grey granite rises a stele adorned with inscriptions, of which the upper part carries a medallion of Berlioz under a gablet and relieved against a gold ground. The medallion, a very good likeness, was executed by M. Godebsky. The opening of M. Formigé's Crematorium, which was to have taken place immediately, is deferred for some months, as also the inauguration of the monument to Gambetta on the Place du Carrousel, at first fixed for the 14th July next, but so much of the sculptor's work remains to be done that the ceremony cannot probably take place before next year.

The new block of the St. Lazare railway station, to the progress of which we have from time to time referred, is to be opened immediately to the public. For some weeks back the façade has shown clear of its scaffoldings, a simple, elegant, but eminently practical piece of architecture, doing great credit to its designer, M. Juste Lisch

The centre of the new façade is occupied by three large openings, giving access to a stone staircase, conducting directly to the large *Salle des pas perdus* of the suburban railways. It is airy, well lighted, and with ample approaches and exits. The demolition has already commenced of the properties in the Rue St. Lazare, which will give place to the great court, behind which will extend a monumental façade 80 mètres in length, uniting the pavilion in the Rue de Rome with that which M. Lisch is soon to erect at the angle of the Rue d'Amsterdam. The goods station adjoining the Pont de l'Europe, of which we have before spoken, is now completely finished and ready for service.

At the Museum of Cluny the decorators are putting the last touches to the exhibition gallery that has been constructed in the court, the floor of which gallery will be laid with a fine piece of work in marble mosaic, somewhat similar to that in the vestibule of the *foyer* of the Opera House. At the Palais de Justice, where the work has been suspended for a year, an effort is to be made to complete, for the Exhibition year, the portion of the building between the Sainte Chapelle, the Quai des Orfèvres, and the Place Dauphine. There is, therefore, a considerable amount of building work going on or in immediate preparation; but, unfortunately, the most important *chantier*, next to that of the Exhibition, remains closed; that, namely, of the Metropolitan Railway, the execution of which seems, by dint of Parliamentary delays, to be adjourned to the Greek Kalends.

In connexion with public works, we may note the curious discovery made recently in constructing, on the southern slope of the Butte Montmartre, a new water reservoir for the city. At a depth of about 5 mètres the workmen came upon two large subterranean galleries running parallel in a straight line towards the extremity of the apse of the ancient church of Saint Pierre de Montmartre. These remains, the existence of which had been suspected by no one, appear to date from the commencement of the twelfth century, and were, probably, intended to place the church in communication with a Benedictine Abbey founded by Louis VI.

At the École des Beaux Arts an exhibition has been opened of the works of Ferdinand Gaillard, whose death we announced in our last letter but one. The exhibition is a very interesting one, as making known to the public the talent of an artist of no ordinary attainments both as a painter and an engraver. The exhibition of the Pastellists, of which we may have more to say, succeeds to that of the Water-colourists, in the Galerie Georges Petit. The exhibition of the "Artistes Indépendentes," organised in a temporary building in the Cour du Carrousel, exhibits as little of talent as last year. One can only commend the courage and hardihood of the exhibitors.

Another has to be added to the melancholy list of suicides among French artists,—that of Gustave Guillaumet. Domestic unhappiness is supposed to have been the cause of this tragic end, which could not, in his case, be attributed to want of success or to financial difficulties. Guillaumet was only forty-seven years of age. His instructors were Felix Barrias and Picot, and he obtained in 1863 the second Prix de Rome. After a long stay in Algeria, which had decisive influence on his career, he obtained medals at the Exhibitions of 1865, 1869, and 1872, and a "troisième medaille" at the International Exhibition of 1878. He was a decided Orientalist, a lover of the rich colouring and picturesque costumes of Africa. Among the works which obtained well-merited success may be mentioned especially his view of Laghouat, purchased by the State at the *Salon* of 1879.

The earnest artist Hillemacher is dead, at the age of sixty-nine years. He leaves two sons, who both obtained the Prix de Rome in music; a rather rare occurrence. He was pupil of Léon Cogniet, and after receiving medals in 1848, '57, '61, and '65, and a decoration in '69, he devoted his latter years to book illustration. His last work was a series of drawings in illustration of Shakspeare.

Royal Birmingham Society of Artists. The twenty-second Spring Exhibition of this society was opened at the Gallery in New-street on Thursday. The whole of the great round room is this time occupied by water-colour paintings.

ARCHÆOLOGICAL DISCOVERIES IN MOROCCO.

During recent years the Danish Consul at Beyrout, Herr J. Löitved, has collated a number of Phœnician, Roman, and Greek antiquities and casts of inscriptions in Morocco, chiefly from the site of the ancient city of Palmyra, which are of great archæological and artistic interest. They are now principally in the possession of the well-known Danish Mæcenas, Herr C. Jacobsen, jun., the wealthy Copenhagen brewer, and have recently been the subject of research by the celebrated French Orientalist, M. Clermont-Ganneau, of the results of which we give the following particulars:—

The collection contains, among other objects, a mummy in perfect condition,—the first specimen of its kind,—found at the necropolis of the city of Zenobia, and some memorial busts in high relief. Among the latter those of the women are of most interest, on account of the clear details of toilette displayed,—as, for instance, the shape of the coiffure, the diadems, necklets, medallions, ear-rings, bracelets, embroidered garments, &c. The execution of the female busts is far superior to that of the busts of the males, the types of the former being very marked, and betokening a decidedly Jewish and Semitic origin, some being remarkably handsome. Fourteen of the busts have epitaphs, which are written in the Armenian dialect common in Palmyra, some peculiarities of which are very interesting, as, for instance, the names "Raitha" and "Hannata," reminding one of the Jewish names "Ruth" and "Hannah," as well as "Caddatha," "Batthai," "Molaï," and "Athihanu." The fifteenth inscription is that of an altar, raised by a person named "Wahbattath" or "Wabda," for the saving of his brother in honour of a deity, who is designated with the vague description, "To him whose name is blessed in all Eternity." In this inscription, which was rather common in Palmyra, M. Ganneau considers that the omission of the name of the deity is purposely committed, just as it is prohibited to the Jews to pronounce the word "Jehovah," a superstition prevalent in the ancient world, chiefly prompted by a desire not to reveal to strangers,—a term at that time synonymous with enemies,—the true name of the deity of the city, in order that his aid should not be invoked. Below the inscription are carved two hands, a symbol of worship well known in Oriental archæology. The latter inscription is dated in hieroglyphics from the month Siwan (June), of the year 502, in the era of the Seleucides, corresponding with the year 191 of our own time.

Among other antiquities collected by Herr Löitved is a semi-column, about one mètre in height, bearing the following inscription, in Greek:—"To the noble Lord Baal-Markod, also called Megrin, by command of the Aremthenian god, Maximos has consecrated [this] in gratitude." The name of this god, by whose command the column was consecrated, is of interest, as it seems to refer to a hitherto unknown city of Aremtha. This column was found at the Maronite convent of Deirel-Kalda, on the Lebanon, about ten miles east-south-east of Beyrout, which is believed to have once been the site of a temple consecrated to the god Baal-Markod. This assumption is supported by the discovery on this spot of several Greek and Roman inscriptions referring to this Semitic god.

Another inscription, unfortunately less complete, but still remarkable in several respects, was discovered by Herr Löitved at Masoub, near Ptolemais (St. Jean d'Acre). It is as follows:—"The Porticus towards west and north, which Elim, despatched by Moloch-Astarte and his servant, Baal-Hammon, have raised for Astarte in Akera, the Temple of Hammon, in Ptolemæos, 26[th] year. The lord of kings, the highly famous Euergetes, son of Ptolemæos and Assince, the twin gods, of the people of Tyrus, 53 years . . . . have also erected all the rest . . . . which are in the land, in order that it may be them . . . . [to eternal honour]." This inscription evidently concerns partially the building of a temple.

Several other inscriptions, of which Herr Löitved has taken casts, refer to various great and small secular buildings. Thus on a house in Bostra is an inscription as follows:—"Under the greatly esteemed Comes Hesycios, Hegemon and Scolasticus, the dwelling of the general-in-

chief was raised from the ground, inasmuch as the greatly esteemed . . . and Cosmos have had the supervision of the same,—the 30 Indiction (September 1st) in the year 489" (B.C.) Another inscription informs us that Rufus Magnus has built the tower at his own cost, it being finished in Damascus in the year 689, *i.e.*, 377 B.C.

At Diasim Herr Löitved discovered this inscription: "The Lord Marcus Flavius Bonus, the most noble Comes of 1 Class and Dux, who has governed us mercifully, has established peace and security as well for travellers as for residents."

On the other hand, there are several inscriptions which refer to non-secular edifices. Thus there is an epitaph at Libka, which states that "a man from the land of the Canates (Canaanites?), brave and wise, Zobedanes, has raised me,—a tomb like a temple. May Providence impart to his children, himself, and his tender wife constant happiness. May it be to me (my fortune) to receive the eldest first when they in happy old age have completed the course of life. Zamargedos has built (me)." The inscription forms three sentences.

An inscription at Irbid says:—"In the year 95 after the founding of the city Lucius Domitius Manorus has caused this tablet (or column) to be erected for himself together with the ornament thereon." The inscription dates from the year 193 B.C. At El-Heyat the following inscription was discovered on a stone:—"Proclus, son of Aumos, has at his own expense raised this Hermes for his son Agrippianos," and in the same spot is a similar inscription according to which this man also raised a Ganymede for the same son.

Finally the following two inscriptions found on the door-beams at Djasim may be quoted:—"Lord Jesus Christ, show your grace towards the whole family of Gerontios. Lord preserve ...." and the second "Georgios, the pious lecturer . . . ."

The number of antiquities and casts collected by Herr Löitved is about 200, and they embrace the period of the whole history of the country, from the time of the Phœnicians down to the first centuries of the Christian era.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE eighth ordinary meeting of this Institute for the present session took place on Monday evening last, Mr. E. I'Anson (President) in the chair.

Architecturul Photographs for the Adelaide Exhibition.

Mr. Ralph Nevill asked permission to say a few words of explanation in regard to the photographs about to be sent to the Adelaide Jubilee Exhibition. Nothing, he said, could have been easier than to make a fancy ideal of what a thoroughly representative collection should be, but nothing could be more difficult than to realise that ideal. The collection which had been got together should not be judged by any fancy standard or ideal. The time at the disposal of the Committee was short, and when they set to work they found in existence only a small number of accessible photographs. They therefore came to the conclusion that it was of no use to waste their strength by trying to make it a thoroughly representative collection, but that they must do the best they could with the material before them. The various provincial associations willingly responded to the invitation of the Committee, and promised to do what they could in the short time at their disposal, but, unfortunately, when the time drew near they heard from Manchester and elsewhere that the weather had interfered very much with the taking and printing of the photographs. He believed this was the first official exhibition of architectural photographs, and many of the members might be sceptical as to the success of such an exhibition. Having said so much to explain why he deprecated the application of what would be an unfair standard to the collection, he would claim for it that it was of extreme interest and value, and, on the whole, very typical and representative of the prevailing tendency of the art in the present day. The number was limited to 100 photographs, and it would be ridiculous to suppose that the whole of English architecture could be represented by that number. He had always been very much of opinion that photographs were the truest illustrations of architecture, after making allowance for all their shortcomings, while for interiors and details they were more correct than any drawings ever could be. He hoped that the day was not far distant when architectural photographs would be admitted to the walls of the Architectural Room at the Royal Academy.

Mr. Octavius Hansard proposed a vote of thanks to the secretaries of the Art Committee for the trouble they had taken in connexion with this matter.

Mr. Charles Barry, in supporting it, suggested that the Council, in sending this collection, should take advantage of Mr. Nevill's observations, and point out the difficulties that had been met with in forming the collection, and the impossibility of its being a purely representative one.

A Carved Oak Beam at Colchester.

A drawing was exhibited by Major Bale, R.E., Associate, of a curious carved oak beam in a house at Colchester, known as the Marquis of Granby. The description of the beam will appear in the Transactions.

A vote of thanks was, on the motion of Mr. C. F. Hayward, passed to Major Bale for his communication.

The Holloway Sanatorium and the Royal Holloway College.

Mr. W. H. Crossland then read a paper entitled "The Holloway Sanatorium and the Royal Holloway College." The following is an abstract of the paper:—

The author prefaced his description of the College by a short account of the Holloway Sanatorium, Virginia Water, and of how it fell to his lot to execute that building. The author and the late Mr. J. P. Jones submitted a design for the Sanatorium in a limited competition instituted by the late Mr. Holloway, who acted in the matter under the advice of Mr. George Godwin, the late Professor Donaldson, and the late Thomas Henry Wyatt. That design was placed first by the professional assessors, and the joint authors proceeded to modify their design to meet the views of Mr. Holloway and of his advisers. Mr. Jones died suddenly, shortly after the commencement of the building operations, and the author was entrusted with the duty of superintending the carrying out of the work. He had to put on one side the whole set of working drawings and to prepare a fresh set, a change necessitated by the substitution of Portland stone dressings for cut and rubbed brick. When the time came for opening the Sanatorium, new Acts of Parliament for the protection of lunatics had been passed, and the Commissioners refused to pass the building as at first constructed. Consequently the whole of the internal arrangements had to be altered at considerable cost, and practically back to their original form. Passing to the main subject of his paper, the author then described the discussions held between Mr. Holloway and himself, at the time that the building of the Sanatorium was fully in hand, as to the best means of carrying out Mr. Holloway's intention of erecting a large college for the higher education of women, and as to the style of architecture most suitable for such a building. The result of these consultations was that Mr. Crossland was commissioned to measure up and sketch the châteaux in the valley of the Loire, more especially that of Chambord, with a view to the adoption of the French Renaissance style of architecture in the new college. That was done very thoroughly, and a design was prepared which was ultimately adopted for the new building, notwithstanding the pressure brought to bear upon Mr. Holloway by others interested in the new building, to adopt a style of architecture similar to that in which most of the colleges of Oxford and Cambridge are built. The working out of the design to $\frac{1}{8}$-inch, $\frac{1}{4}$-inch, and $\frac{1}{2}$-inch scales, and the preparation of the full-size details, occupied the author for two years,—when it was decided to employ a quantity surveyor to take out the "quantities" after a plan which had been agreed upon between Mr. Holloway and the author. He was anxious above all things to have the quantities made intelligible to himself, so that in case of disagreement on the questions of certificates, extras, or deductions, the point in dispute might be determined without the aid of the surveyor. The result of the method employed, viz., that of cutting the building up into blocks, had been that the contractor not only has had no extras on either the original contract, or upon other contracts priced from the same bills, but had not even asked for an order for extras. Ten building firms were asked to tender upon the quantities thus prepared, and, in the end, Mr. Thompson, of Peterborough, was entrusted with the execution of the work, and had carried it out to the complete satisfaction of the author. A clerk of works, Mr. George Rogers, was appointed by Mr. Holloway, and was directed to confine his duties to the inspection of the actual works, and to undertake neither correspondence nor drawings of any description. He dispensed altogether with the luxury of an office, and during five years never passed a day, hardly even a working hour, away from the works. When the works were fairly started, the author had a bungalow built, and went into residence on the spot. For the next four years and a half he found himself leading the life of a Mediæval architect,—such a life as architects read about, but which few experienced. The author then briefly described the plan of the College.* The scholastic department is contained in the two main blocks, and these are connected by rooms, cloisters, and balconies. The refectory and kitchen are arranged on the usual college plan, and are divided by the central hall or vestibule. The museum and library, also the recreation-hall, communicate directly with the two main blocks. These rooms, and also the refectory, are 100 ft. by 30 ft. by 30 ft. high. The chapel is 125 ft. by 30 ft. by 35 ft. high. Each student will have two rooms, study and bed-room, each 12 ft. by 10 ft., 10 ft. 6 in. high, and a common-room is provided for every six students, where they can hold tea-and-toast parties or other entertainments. The building is planned to accommodate 250 students, but on so liberal a scale that fifty may be added to this number, and, including servants, 400 may be set down as the actual accommodation. Some twelve months after the commencement of the works the author had to select and appoint a sculptor, and was fortunate enough to secure the services of the late Signor Fucigna, member of the Academy of Ferrara, who was willing, like the author, to live on the works, and to devote all his time to them. The illustrations of his work, which were exhibited, were sufficient to show the stamp of Signor Fucigna's genius, and that the profession lost in him a sculptor of rare ability, who did not think architectural sculpture too poor a ground for the exercise of his talent. The genius of such a man and of such sculptors as the late Alfred Stevens, and the Frenchman Briants, neither of whom was properly appreciated during his lifetime, might often be secured by prosperous men in the architectural profession, to the advantage, not only of themselves, but of the nation and of the whole world. The principal work executed by Signor Fucigna at the college consisted of the filling of the four pediments which formed centres in the two quadrangles over the principal staircases, the carving of a series of heads, forming key-stones to the chapel and recreation-hall windows, the execution of the subjects in the chapel ceiling in very bold relief, and of various heraldic subjects and smaller panels in the heads of the windows, at various points all round the building. The only portions of the building decorated internally in colour are the central vestibule, between the dining-hall and kitchen, and the chapel. This latter has been decorated in oil colour and gold, the warm ivory-tinted free-stone used in the construction forming the basis. The strongest stroke of colour is applied to the lower division of the wall, forming a very rich and elaborate dado from the floor to the window cills. The flat wall spaces above this are of a soft green, broken by deep red in the niches between the windows. The waggon vault of the ceiling is treated with gold as a ground-work, but this is divided into panels by longitudinal and transverse belts, corresponding with the architectural divisions below, and in the panel spaces thus formed are circular medallions containing figures of the six Archangels, *e.g.*, SS. Michael, Gabriel, Raphael, Uriel, Zophiel, and Chamuel, with their distinctive attributes. These, like the subject on the semi-dome of the apse, are on blue grounds. The groups of figures on the

* A Ground Plan and four views of the College were given in the *Builder* for July 3 and July 10, 1886; and further illustrations and descriptions will be found in previous volumes. Plans, views, and descriptions of the Sanatorium will be found in our volumes for 1875, 1877, and 1882.

ceiling and in the apse are treated delicately in colour, somewhat in the manner of old ivories, that is, the colour is worked into the hollows of draperies, &c., and rubbed off the more salient surfaces, thus avoiding heaviness. The general scale of colour obtained by this means is not unlike that of the Sistine Chapel. In the apse, and in a line with the side niches, are three recessed arches, in which are placed standing figures of Our Lord, St. Mary, and St. Cecilia. Right and left of the organ, at the west end, are two medallions, each containing two angels singing and playing on musical instruments. The author then described the fittings, noticing particularly the baldacchino, the organ-case, the library fittings, and some wrought-iron gates, grilles, and low screens in front of the west chapel, the former made in walnut and oak, and the latter of wrought and welded iron, and without rivets or screws. The brass fittings, such as lamps, electroliers, and brackets, also made from the author's designs, are of a high class of workmanship. In the electric light installation there are ninety-six 32-candle power incandescent lamps, 216 16-candle power, and 100 10-candle power, making a total equivalent of about 750 10-candle power lamps, which may now be taken as the standard lamp. The principal portions only of the building, such as principal entrance, chapel, recreation-hall, dining-hall, lecture theatre, museum and library, kitchen and scullery, are provided with the electric light at present. The electricity is generated from dynamos driven from two engines of Messrs. Davey, Paxman, & Co.'s make, through intermediate gearing. The dynamos, two in number, are of American manufacture, one being held in reserve. Both are connected to the main cable, and are each of them more than sufficient for the present number of lights wired for. Edison screw sockets and lamps are used throughout. The heating of the building is effected by means of steam radiators, made of 1-in. wrought-iron pipes, fixed vertically in a hollow cast-iron base, with an entablature of ornamental design. A main 6-in. steam-pipe leads direct from the boiler-house to the centre of the main building, where a receiver is fixed, from which all branches are taken through reducing-valves. To insure the delivery of steam at all points, three pipes are employed,—one supply 4-in. bore, one return 3-in., both running in the same direction, and from the extremities a condensed water-pipe is led back to a container in the basement, from which the water of condensation returns by gravity to the boiler to be re-used. The steam plant power, the gas service, the water supply, the fire service, and the sanitary arrangements were then described. The drains pass around the building in straight lines from point to point, with manholes at all changes of direction and gradient. The sizes of pipes are 6 in., the main outlet being 9 in. in diameter. The soil-pipes and wastes deliver into inspection chambers, beyond which an interceptor trap severs connexion with the main drain. Flush tanks of 500 gallons capacity, built in brick and cement, are fixed at the head of each main drain. The building, Mr. Crossland stated, has been opened before it is in a really working condition. Several important additions, such as a laundry and a complete system of fire service, will be necessary before the whole will be completely finished. The author would in conclusion, he said, draw particular attention to three points referred to in his paper, viz., his experience of clients in general, and of Mr. Holloway in particular, as a model client; secondly, to the subject of quantities; and thirdly, to a subject that he had himself particularly at heart, the unity which he thought should exist between architect and sculptor on all works of importance. He thought that if architects who are entrusted with large public buildings were to associate themselves with some sculptor of equal ability, we should not only get more interesting buildings, but should be spared the shame and dishonour of seeing such men as Alfred Stevens and Briants taken away without leaving more examples of their great genius for the benefit of succeeding ages.

In the discussion which followed,

Mr. David Chadwick, one of the Governors of the College, remarked that the completion of Holloway College was an achievement of which the Royal Institute of British Architects might well feel proud as the work of one of its members. Mr. Crossland had given a well-deserved meed of praise to all the parties with whom he had been associated, and he had been fortunate in having a client with a long purse. At the same time, although he had almost unlimited funds to draw upon, he had achieved the success of completing the building without any extras. Whether regarded from an artistic or sanitary point of view, all the arrangements of the building had been carried out as perfectly as the appliances of the present day were capable of permitting. He (the speaker) looked upon the Holloway College as the most perfect building that had been erected during the present generation, and there was not a dark room or an unventilated corner to be found in the whole structure.

Professor T. Roger Smith, in proposing a vote of thanks to Mr. Crossland, remarked that he had always thought that the most useful papers that could be procured by the secretary from members of the Institute were accounts of important buildings. They were therefore extremely indebted to Mr. Crossland for his paper, and for filling the room with drawings and photographs which enabled them to form some guess as to the extent and dignity of the structures. He wished, for the sake of those who had not had the advantage of seeing the building, that some of the leading dimensions had been given, but having himself had an opportunity of seeing the College, he might say that it was one of those buildings that gave the architect an idea of the effect of great size. There were not in this country many very large architectural buildings. There were many small and moderate-sized buildings, but the number of structures in which the dimensions of great length, and the effect of great extent, were to be studied, was small. Such buildings as Versailles, the Louvre, and the Tuileries, which gave one an idea of enormous size, were scarce in England, but the Holloway College was one, and if for no other reason than that, it deserved to be seen and studied by those who wished to appreciate that particular element. The style adopted was one which merited probably more extensive usage. There was no more beautiful version of Renaissance architecture than that of the time of François Premier in France, and which the late Edward Barry to some extent adopted. The Holloway College, however, was the largest and most important building in that style which had been erected in England, and on that account alone it was of extreme interest to architects.

Mr. William Woodward said Mr. Crossland had claimed that by a peculiar system of taking out the quantities, he had avoided all extras, and he hoped, in replying, that a little more information would be given on that important matter. Men in practice, of course, were well aware that there might be great merit in a building being carried out without extras, or no merit whatever. The merit or demerit depended almost entirely on the manner in which the quantities had been taken out, and the way in which the building had been studied before it was commenced. He would therefore like to know whether, before the building was commenced, the drawings and details were fully completed? The name of Alfred Stevens had been several times mentioned in the paper, but there was considerable difference of opinion as to his work, and particularly with regard to the Wellington monument in St. Paul's Cathedral.

Mr. Henry Lovegrove supported the vote of thanks, and asked whether extras were avoided by some very heavy "provisions"? And he wished to know whether it was advisable that it should go forth from the Institute that it was desirable to advertise for surveyors at so much a day or week? Because, if that practice were sanctioned, they would have architects advertised for in the same manner.

Mr. Ralph Nevill asked whether the warming of the college was done by steam?

Mr. Crossland, in reply to some of the questions asked, said, that as to the quantities, he was at work with all his staff for two years on the plans, which were of the most detailed description, and these were placed at the disposal of the surveyor. The completed plans were bound up in three large volumes, and were never afterwards altered. In regard to extras, he had with him a copy of the quantities very carefully illustrated, and by the plans and sections he could show how it was arranged. Each story formed a separate bill of quantities, and though there was undoubtedly great repetition, the arrangement proved useful for checking, and that to a great extent accounted for the accuracy of the quantities, and the non-existence of extras. Moreover, Mr. Thompson, the builder, had not only had no extras, but he had not even applied for an order for them. The clerk of works had not interfered with the drawings, and so had not needed an office; in fact, he (Mr. Crossland) had been his own clerk of works, living on the building. What the clerk had to do was to walk round and round the scaffolding ten or a dozen times a day, and one of the things which he did was to see that the perpends of the brickwork were as true as a line could make them. Mr. Crossland then gave some further particulars as to the lighting and warming of the building.

Mr. C. F. Hayward, F.S.A., said that the effect of the size of the College was very great, and the way it grew upon one was a proof of the character of the work itself. Though he himself had a rather stronger sympathy with work of the Gothic school, he could not help feeling that the design had been worked out in the spirit of true art. The alliance between architect and sculptor, and the high ground on which Mr. Crossland had placed the necessity for that union, was deserving of the recognition of the Institute.

The President, in closing the discussion, said that Mr. Crossland had with great personal modesty given the meeting the history of a most interesting building. He appeared to have led the ideal life of the architect, with a munificent patron, almost unlimited means, and having visited with his patron such interesting and picturesque monuments on the Loire as Chambord, Chenonceaux, Chaumont, and Blois, he came back with his mind full of the object he had to carry out, and able to devote his whole time to the development of his work. Mr. Crossland had been his own architect and clerk of works, and nothing could be more satisfactory to the architect than to have the means of carrying on his work in that agreeable manner.

The vote of thanks was then passed by acclamation.

The President added that Mr. Chadwick gave him authority to state that a visit to the College would be arranged to take place on Tuesday, the 3rd of May, during the coming General Conference of Architects. He also announced that a business meeting would be held on the 18th of April to consider the Schedule of Professional Practice and Charges of Architects.

The Smoke Nuisance in London.—The Bill introduced by Lord Stratheden into the House of Lords for abating the nuisance arising from the smoke of furnaces and fireplaces in London will have little chance of becoming law if he insists upon retaining the clause which includes private dwelling-houses in its operation. Lord Stratheden proposes to enable the local authority,—that is, the Commissioners of Sewers in the City, the Vestry in a parish of schedule A of the Metropolis Management Act, and the District Board in combined parishes of schedule B,—to make bylaws, not only for regulating but even for prohibiting, the emission of smoke from any building. These bylaws might exempt from their operation buildings below a certain rateable value; or they might limit the hours within which they are to be in force; or they might contain any other restrictions thought expedient. By these bylaws reasonable penalties might be imposed on offenders against them. But without the Attorney-General's consent no proceedings could be taken for the recovery of a penalty by any one but the local authority. Before being of any validity the bylaws would have to be confirmed by the Home Secretary, and opportunity would be afforded to any person affected to send his objections to that Minister. Other bylaws might also be made under the Bill by the Metropolitan Board of Works as to new buildings. All fireplaces or furnaces intended to be used in these could then be required to be so constructed as to effectually consume, as far as possible, all smoke arising from them. While no reasonable man would object to the proposal to have new dwelling-houses provided with fireplaces consuming their own smoke, and in accordance with the aim of the Bill, any attempt to include existing private houses will result in its rejection, or at least in such a mutilation of its provisions as will practically render them inoperative.—*Iron.*

ELECTIONS OF DISTRICT SURVEYORS.

AT the meeting of the Metropolitan Board of Works on the 25th ult., the first business proceeded with after the confirmation of the minutes of the previous meeting was the election of a District Surveyor for South Islington, in the room of Mr. Rowland Plumbe, transferred to the District of West Hampstead. There were thirty-five candidates, not counting two who failed to put in an appearance. In accordance with the usual practice of the Board, a show of hands was taken on behalf of each of the thirty-five candidates who were present, with the view of retaining the six candidates who obtained the highest number of votes for the final contest, which was, in conformity with a motion made by Mr. T. W. Williams, decided by ballot. The candidates present were:—Messrs. T. Batterbury, H. Blackbourn, H. H. Bridgman, J. W. Brooker, H. Cheston, P. Cowper, F. E. Eales, G. Edwards, F. R. Farrow, J. M. Ferguson, R. F. C. Francis, J. Goodchild, W. Grellier, F. W. Hamilton, J. Hamilton, G. Hamilton-Gordon, W. J. Hardcastle, E. Haslehurst, A. Heyes, G. Inskipp, G. Jackson, N. E. Jennings, G. A. Lean, H. Lovegrove, E. W. Mountford, R. C. Murray, W. H. Nash, H. A. Peliy, C. G. Saunders, M. L. Saunders, W. Smallpeice, W. L. Spiers, W. H. Stevens, H. W. Stock, and E. Woodthorpe, jun., M.A.

The preliminary voting on these names placed the following six names highest on the list, viz., Batterbury, 32; Hardcastle, 25; Lovegrove, 34; Saunders (M. L.), 33; Spiers, 26; and Stock, H. W., 32. The subsequent voting was as follows:—

	2nd Vote	3rd Vote	4th Vote	5th Vote†	6th Vote‡	Final Vote
Batterbury	9	15	16	15	30	21
Hardcastle	4	4	—	—	—	—
Lovegrove	12	16	16	18	—	27
Saunders (M.L.)	14	13	16	15	19	—
Spiers	3*	—	—	—	—	—
Stock	3*	—	—	—	—	—

The ultimate result of this curious contest, in which, as will be seen, there were three "ties," was that Mr. Henry Lovegrove was declared to be elected.

The Works and General Purposes Committee have considered the reference made to them by the Board as to the future mode of conducting the election of District Surveyors, and have resolved to recommend:—

"(*a*) That the number of candidates be reduced to six, at a meeting of the Board, by one ballot, at which each Member may vote for six names out of the printed list; the result of such first ballot to be ascertained by scrutineers consisting of two Members of the Board, to be appointed for that purpose, together with the Clerk or his representatives.

(*b*) That the six thus selected be balloted for, each Member of the Board voting for one candidate only, until some one candidate has the votes of a majority of the Members present, and that at each ballot the name of the candidate having the smallest number of votes, or the names of all candidates who have less than twenty per cent. of the total number of votes, be struck off."

Mr. Williams has given notice that when the report of the Committee comes before the Board he will move, as an amendment to the first (*a*) of the above recommendations:—

"That the number of candidates be reduced to six, at a meeting of the Works and General Purposes Committee, by one ballot, at which each Member may vote for six persons whose names are in the printed list; the result of such first ballot to be ascertained by scrutineers consisting of two Members to be appointed for that purpose, together with the Clerk or his representative; and that the names of the six persons thus selected be taken up to the Board at the following meeting, in order that the Board itself may make the ultimate selection."

NOTES FROM SWEDEN.

A NEW theatre, with very handsome appearance and fittings, called the Wasa Theatre, has just been opened in Stockholm. It seats 700 persons, and is lighted by the electric light.

The great new building of the Stockholm Telephone Company, in which the central station will be located, is approaching completion. The principal operating hall will be lighted from the roof, which is of glass, and at night the electric light will be employed. On the walls of the hall will be hung some fine paintings illustrating great events in the history of science, and they will also be decorated with the coats of arms of the towns of Sweden which have adopted the telephone.

The well-known German circus proprietor, Herr G. Schumann, having petitioned the Corporation of Stockholm for permission to erect a large modern circus building in one of the central parts of the town, the sanitary committee of that body has refused the same, on the ground that, however carefully such an establishment be built and tended, an unpleasant and injurious smell therefrom cannot be avoided.

During the last two or three years attempts have been made in Scotland with cultivating saplings of pine and spruce brought from Sweden and Norway, and, as appears from a recent report from the consul for those countries at Leith, with the most satisfactory results. Attempts to grow these trees from seed have, however, not been so successful, most probably, it is believed, from want of sufficient care. In consequence, several Swedish and Norwegian societies interested in this matter have decided upon sending competent persons to this country with a view to promote the import of saplings and seed from these kinds of trees. In Sweden, as is generally known, replanting goes hand in hand with de-forestation, though, of course, the former operations necessarily demand a longer time in showing results.

Formerly, the imports to Scotland of Swedish glass wares,—chiefly bottles,—was very considerable, but of late years it has fallen off greatly, owing to several works near Leith and Glasgow having imported a number of Swedish glass-blowers, who, as they work for lower wages than the English, enable the manufacturer to produce the goods at a cost less than in Sweden. This is felt as a serious blow to the Swedish glass industry.

A company has been formed in Scania, in the South of Sweden, for the purpose of manufacturing salt-glazed drain-pipes, paving-stones, tiles, &c., articles which have hitherto been imported from abroad. The company has purchased the well-known Skromberg clay deposits, which are estimated to last for several hundred years, for a sum of 25,000*l*.

Great satisfaction is felt in Sweden at the circumstance that the pedestal of the statue of Hugo Grotius, the celebrated Dutch lawyer, which was recently unveiled at Delft, is of Swedish granite. It was cut in Berlin, after a drawing by M. Garnier, the French architect, and weighs over half a ton, and is 12 ft. high. It is considered an illustration of the high renown which Swedish granite enjoys abroad.

---

* Both names dropped at this stage by resolution of the Board.

† To decide which of the three names previously voted upon should be dropped.

‡ To decide whether Batterbury or Saunders should be dropped.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

ANNUAL DINNER.

THE ninth annual dinner in aid of the funds of this Institution was held on Tuesday evening last, in the Venetian Saloon of the Holborn Restaurant, Mr. W. R. Freeman (of the firm of John Mowlem & Co.), President, in the chair, supported by so large a number of friends that an "overflow" party had to dine in another room. The usual loyal and patriotic toasts having been duly honoured (Mr. T. F. Rider proposing the "Army, Navy, and Reserve Forces," and Col. Trollope, of the Queen's Westminster Rifles, and Mr. George Burt, jun., of the Royal Naval Reserve, responding),

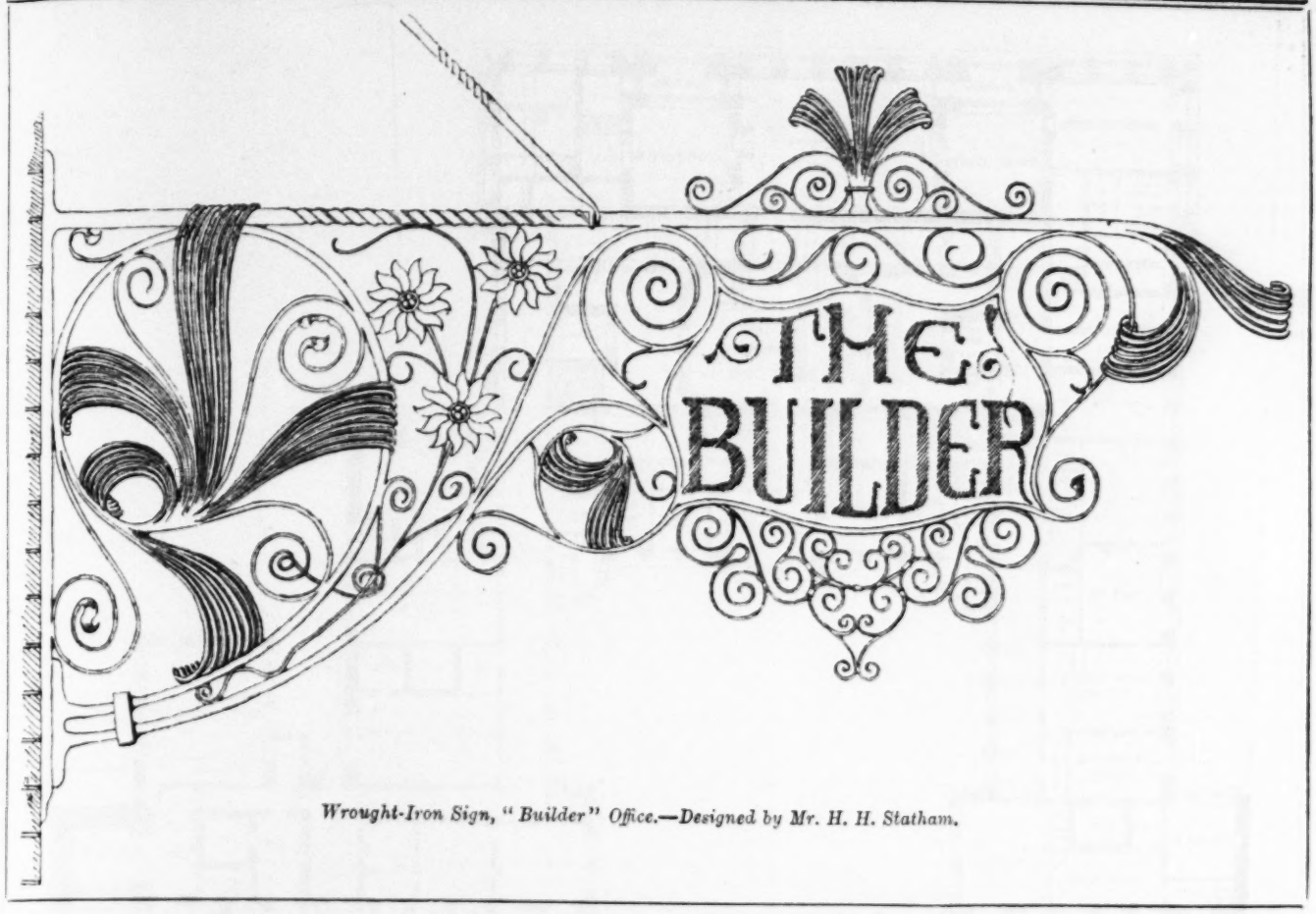
The Chairman, in proposing the toast of the evening, "The Builders' Clerks' Benevolent Institution," said he had to plead the cause of an Institution which he was able to say was very carefully and economically managed by a thoroughly earnest and painstaking committee, and which undoubtedly supplied a great want. He therefore felt that he should not plead in vain. The Institution was founded in 1866, and therefore it attained its majority in this present year of Jubilee. During its existence it had received a total income of about 8,500*l*., and had expended, in pensions and relief, upwards of 3,000*l*. There had been in all twenty-five pensioners elected on its funds, the number on the books at the present time being fifteen. The male pensioners received, according to their necessities, from 20*l*. to 25*l*. per annum, and the female pensioners from 15*l*. to 20*l*. per annum. The Institution also afforded temporary relief to the extent of not more than 10*l*. in one year to as many deserving cases as possible, and it also provided burial-money and other relief to widows of builders' clerks dying in distressed circumstances, every case being most carefully inquired into without delay. At the same time, care was taken to prevent the pauperising of the recipients of the Institution's aid. Personally he had great pleasure in advocating the claims of the Institution, for he was much indebted to builders' clerks for his business education, and had, indeed, served as a builder's clerk himself. The Institution was one which must commend itself to all connected with the building trade, but in a special manner to the clerks themselves, who should, he could not help thinking, support it in greater numbers than they did. The master builders took the kindliest interest in its welfare, while the builders' merchants were liberal supporters. So convinced was he of the utility and absolute necessity of the Institution in these days of competition and the consequent sad vicissitudes of builders' clerks, that had no such Institution been in existence he should have done his part in founding one. Fortunately, that work had not to be done, for it was done twenty-one years ago, and the Institution had now arrived at manhood's estate; and as it had increasing claims upon it, it would probably want a little more scope and a little more cash than hitherto in order to enable it to fulfil its mission. On these grounds he warmly commended the claims of the Institution to the building trade and all connected with it, and asked the company to drink to the success of the Institution.

The other toasts were "The Architects and Surveyors," proposed by Mr. J. Howard Colls (President of the Institute of Builders), and replied to by Mr. W. E. Stoner; "The Builders," proposed by Mr. E. C. Roe, and coupled with the name of Mr. Joseph Randall (Kirk & Randall); "The Past Presidents," proposed by Mr. Edwin Brooks (Treasurer), and replied to by Messrs. Thomas Stirling and G. Haward Trollope; "The President," proposed by Mr. G. H. Trollope; "The Visitors," proposed by Mr. G. C. Kentish, and coupled with the name of Mr. Stanton William Preston, Clerk of the Worshipful Company of Carpenters; and "The Committee," proposed by the Chairman, and coupled with the name of Mr. H. J. Wheatley, the indefatigable Secretary, who during the evening announced subscriptions and donations to the total amount of 384*l*.

ARTISANS' DWELLINGS NEAR GROSVENOR SQUARE.

THE Improved Industrial Dwellings Company (Limited), having acquired from the Duke of Westminster several sites lying between Oxford-street and Grosvenor-square, have commenced operations in earnest in that locality, and on Wednesday last a block of tenements, to be known as "Stalbridge Buildings," was opened by the Duke of Westminster. This block is situated in Lumley-street, and is to be followed by eight other blocks in the immediate vicinity. The block in Lumley-street contains accommodation for 46 families; the next, to be erected between Lumley-street and Balderton-street, will provide for 72 families; and the remaining seven blocks will provide for about 258 families. These, with the 38 families in Clarendon Buildings, Balderton-street,—erected in 1872,—will represent a total of nearly 2,000 persons of the working class resident on this part of the Estate. The cost of the whole will be about 80 000*l*. The general plans, elevations, and working drawings have been prepared in the Company's offices, and the buildings are being erected by the company's workmen. Each dwelling contains separate domestic conveniences, and the woodwork in the rooms is painted, grained, and varnished, and the walls neatly papered. Washhouses are provided on the roofs. The company has, during the past seventeen years, erected in other parts of the Grosvenor Estate, 381 separate dwellings for about 1,900 persons.

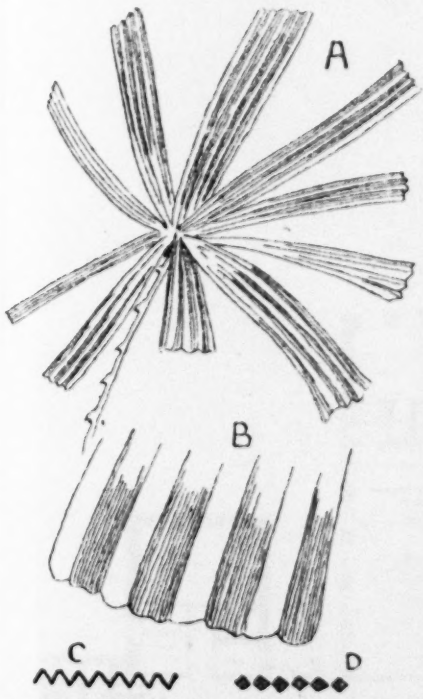
The company now possesses thirty-nine estates in various parts of the metropolis, chiefly in the Central and Eastern Districts, thirty-seven of which are completed for occupation by 24,000 persons of the working classes; and when the new buildings in Mint-street, Southwark, are occupied, and those on the Grosvenor Estate completed, there will be accommodation in the company's buildings for 26,000 persons. The total expenditure will then have been about 1,025,000*l*.



Wrought-Iron Sign, "Builder" Office.—Designed by Mr. H. H. Statham.

THE "BUILDER" SIGN.

THE wrought-iron sign, of which a sketch is given, was one of the last things carried out at the forge of the late Mr. Alfred Newman before his lamented death. The long leaf-forms which are the principal feature in it are conventionalised from a spray of a tropical plant (*Licuala horrida*), sketched in the hot-house at the Botanic Gardens. The spray as originally sketched is given at A, and the end of a leaf, nearly full size, at B. It was at



first intended to make the wrought-iron leaves of the same kind of ridge-and-furrow section (C) as in the natural leaf, forming each leaf in an oblong shape first and then nipping the ridges close at the springing, as in nature. But it was found the metal in this form was too recusant in regard to the bend and curl which it was desired to give the leaves, and the forgers suggested that a similar effect could be obtained by a section as at D, making each ridge a separate piece, and the whole would then prove ductile and tractable, which was accordingly done. The sign is now fixed above the publishing office of the *Builder*.

H. H. S.

COMPETITIONS.

Board Schools, Bristol.—At the meeting of the Bristol School Board on the 25th ult., the plans of Messrs. Hansom & Bond, of Clifton, were unanimously adopted for the new schools in Easton-road. Thirty-eight sets of designs were sent in.

Wesleyan Schools, Forest Gate. — We are informed that the building committee have selected the plans submitted by Mr. F. Boreham in this competition. Six designs were sent in.

Willesden Public Offices.— The successful competitors for the above, according to the award of Mr. Christian, are:—First Premium, "Favete Linguis," Mr. E. Harnor; Second Premium, "Plan," Messrs. Newman & Newman.

The South Kensington Exhibition Sales.—The second and concluding sale, by Messrs. Horne, Son, & Eversfield, of the materials of the galleries, courts, and annexes lately used for the successive exhibitions, took place last week, the sale occupying three days, and finally terminating on Friday, the 25th of March. The materials disposed of comprised nearly six hundred lots, the principal portion consisting of the materials of the Chinese pavilion and tea houses, the Maltese court, the Canadian and west galleries, and the ornamental bridges across the basins. The sale also included the office furniture and fittings, upwards of one thousand iron and pitch-pine garden-seats, and several hundred iron hurdles. The proceeds of the sale amounted to between 2,000*l.* and 3,000*l.*, which, added to 6,000*l.*, the amount of the first sale, brings up the total amount for these portions of the materials to between 8,000*l.* and 9,000*l.* The three days' sale, by Messrs. Wheatley, Kirk, & Co., of the engines, boilers, and other machinery, and the electric plant, realised upwards of 10,000*l.*; the aggregate proceeds of the varied properties on the grounds belonging to the Royal Commissioners amounting to between 19,000*l.* and 20,000*l.* The grounds have already been cleared to a great extent of the machinery and materials sold within the last month.

Illustrations.

MODERN ORNAMENT.

BY DR. DRESSER.

THIS fine and effective design is reproduced in accordance with the kind consent of the publishers that we should reproduce one plate from Dr. Dresser's recently-completed series of designs, published under the title of "Modern Ornamentation." The plate is slightly reduced from the size of the original, and the colour modified for convenience of printing in connection with other plates; the plate in the work being printed in a rich red tint.

Some general remarks on the work will be found in another column.

DOORWAY, PALAZZO TOLOMEI, SIENA.

THE Palazzo Tolomei is one of the smaller and less well known of those in Siena. It was built by Il Tozzo in 1205, and, notwithstanding subsequent alterations, is still a good specimen of the Italian Domestic Gothic architecture of the first half of the thirteenth century. This doorway seems, from the appearance of the tympanum, to have had its share of modification; but whether the rather incongruous egg and dentil ornaments are original, or a later insertion, we cannot say.

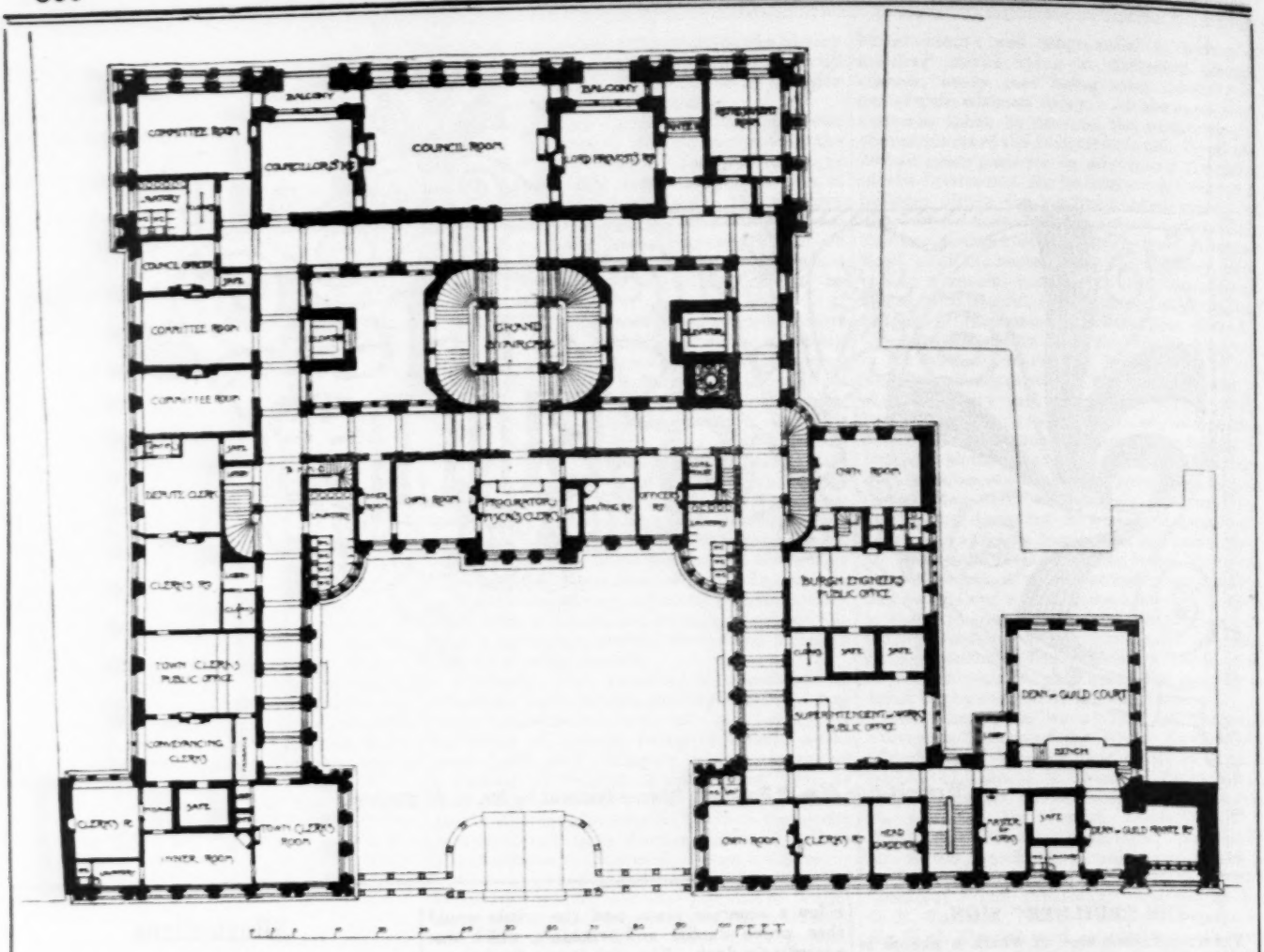
ST. GEORGE'S CHURCH, BECKENHAM.

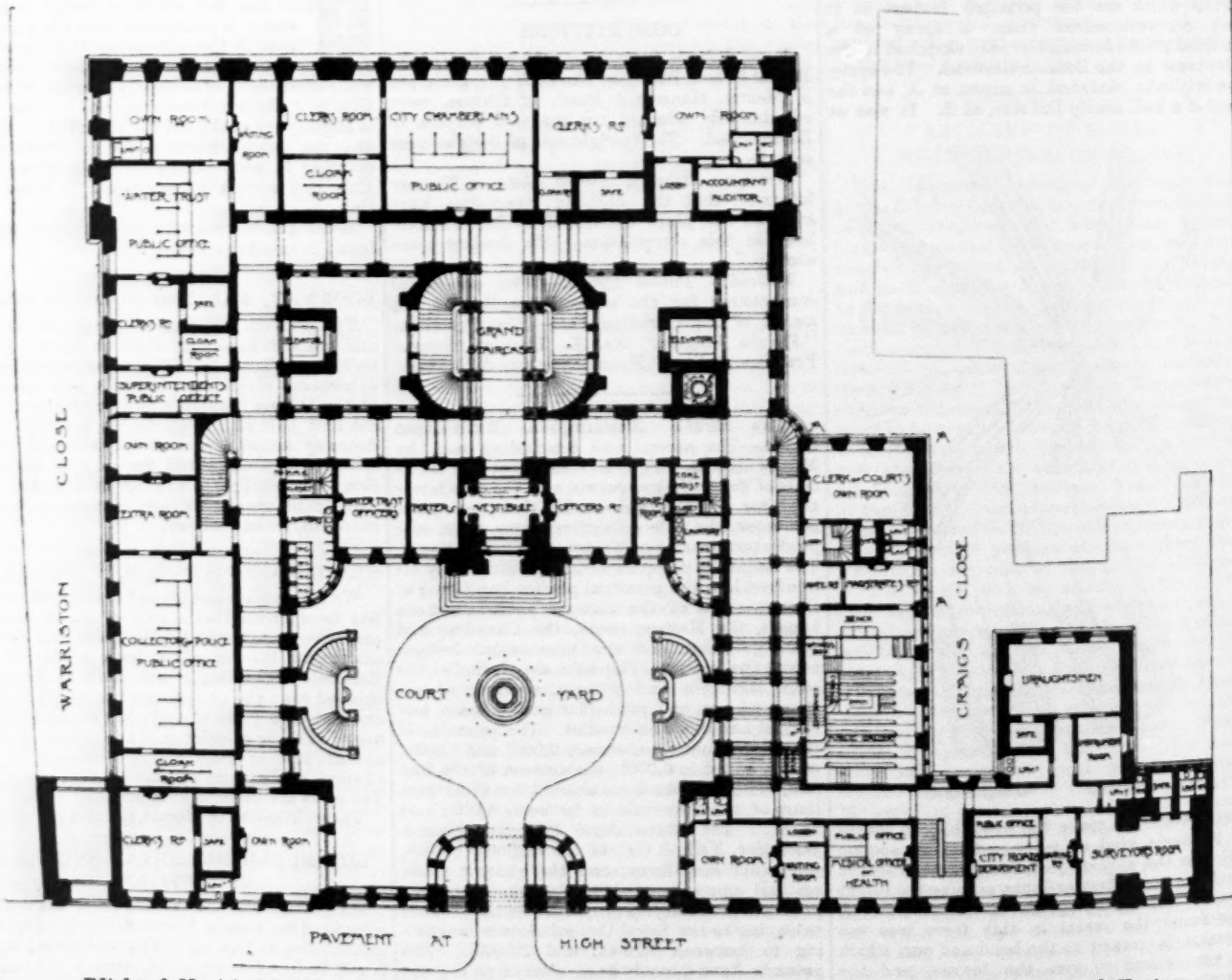
WE give a view and plan of this church, which has been erected at a cost of about 16,000*l.*, exclusive of tower and spire, from the designs and under the superintendence of Mr. W. G. Bartleet. The walls are built in hammer-dressed rag; the chancel roof is of pitch-pine, and the other roofs of deal; the chancel fittings are of oak, the remainder of the fittings of deal, and the floor of wood blocks, excepting in the chancel, chapel, and passages, which are tiled. The roofs are covered with Broseley tiles.

The builders were Messrs. Cornish & Gaymer.

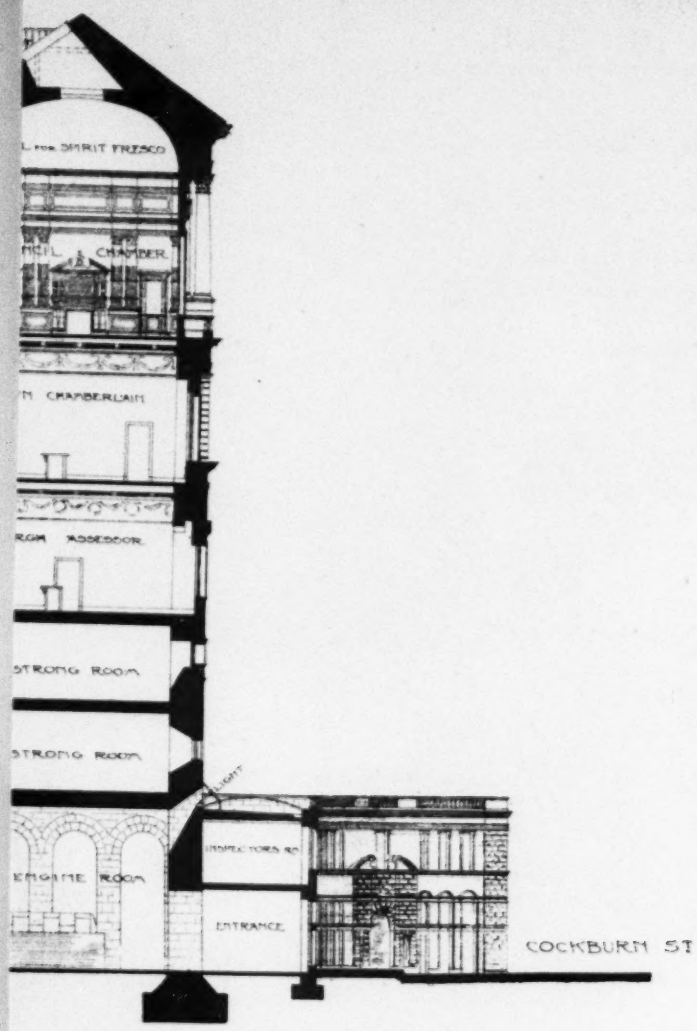
EDINBURGH MUNICIPAL BUILDINGS COMPETITION.

WE give this week illustrations of the design submitted by Messrs. Morris & Hunt, under the motto "Ora et Labora." Our comments upon it will be found on page 312, *ante*, in the course of the article devoted to the designs in our issue of February 26th.

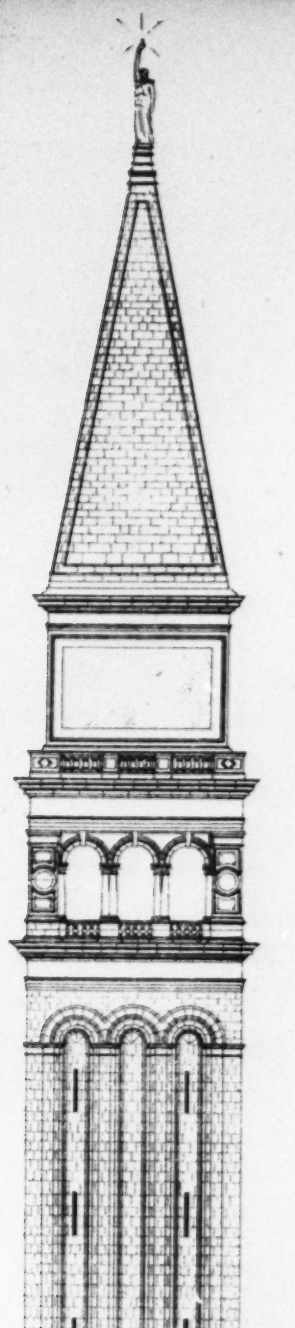


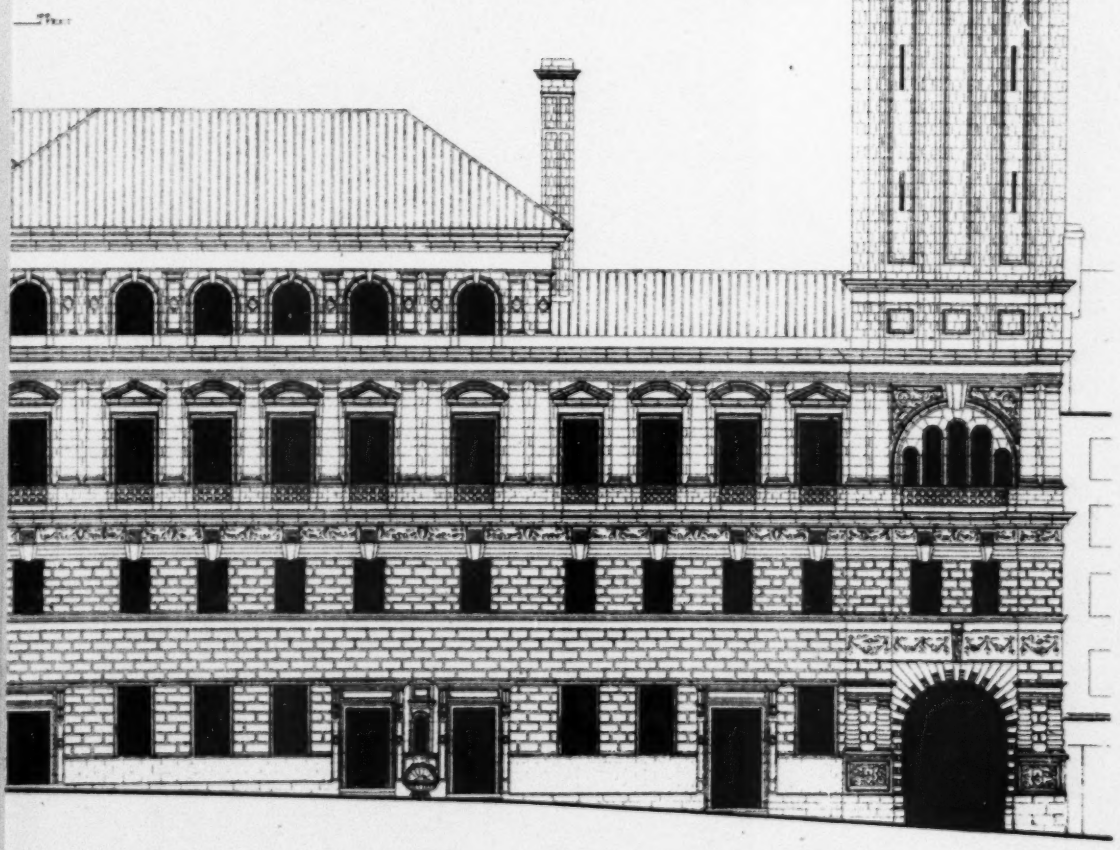


Edinburgh Municipal Buildings Competition.—Ground and First Floor Plans of Design submitted by Messrs. Morris & Hunt.



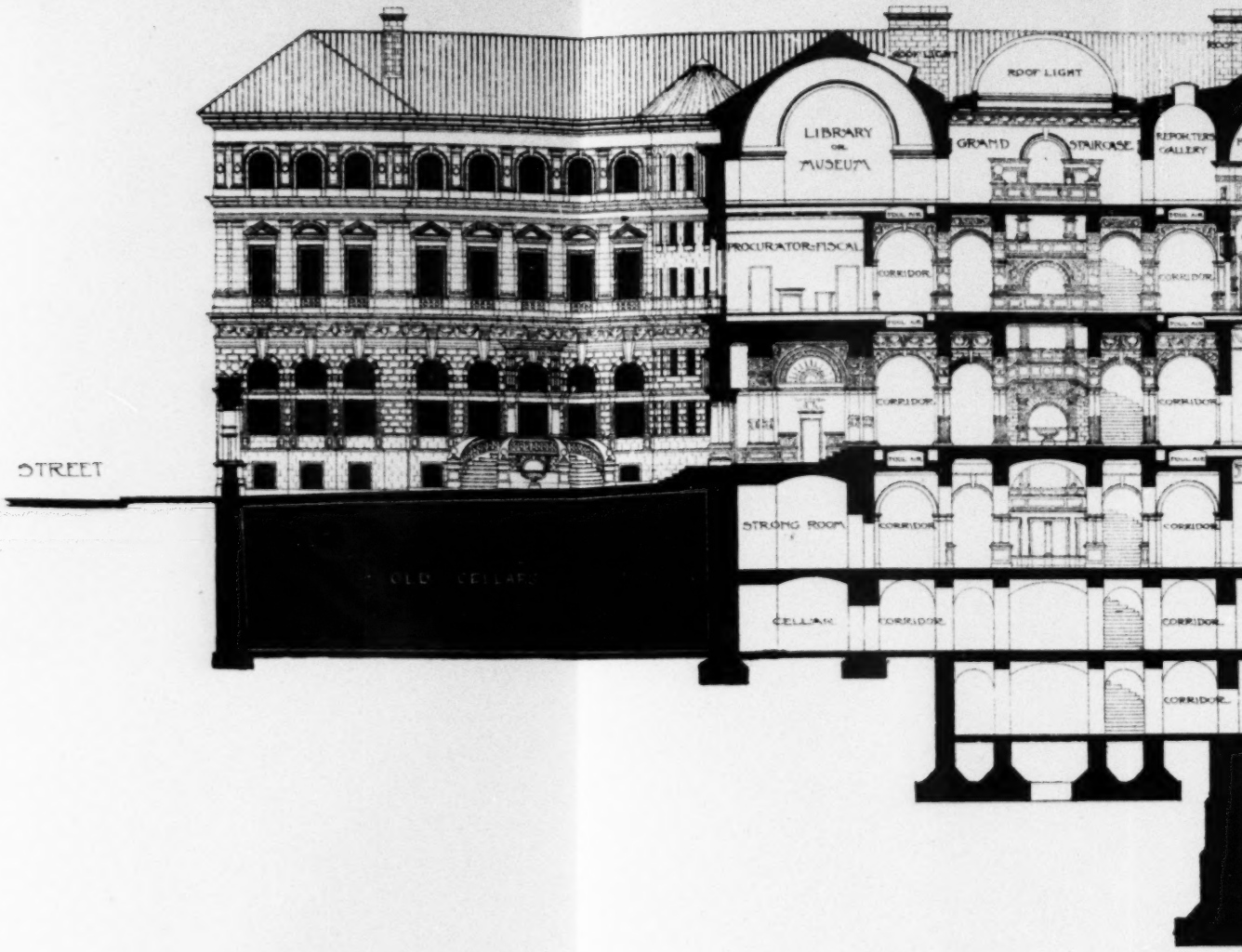
COURTYARD



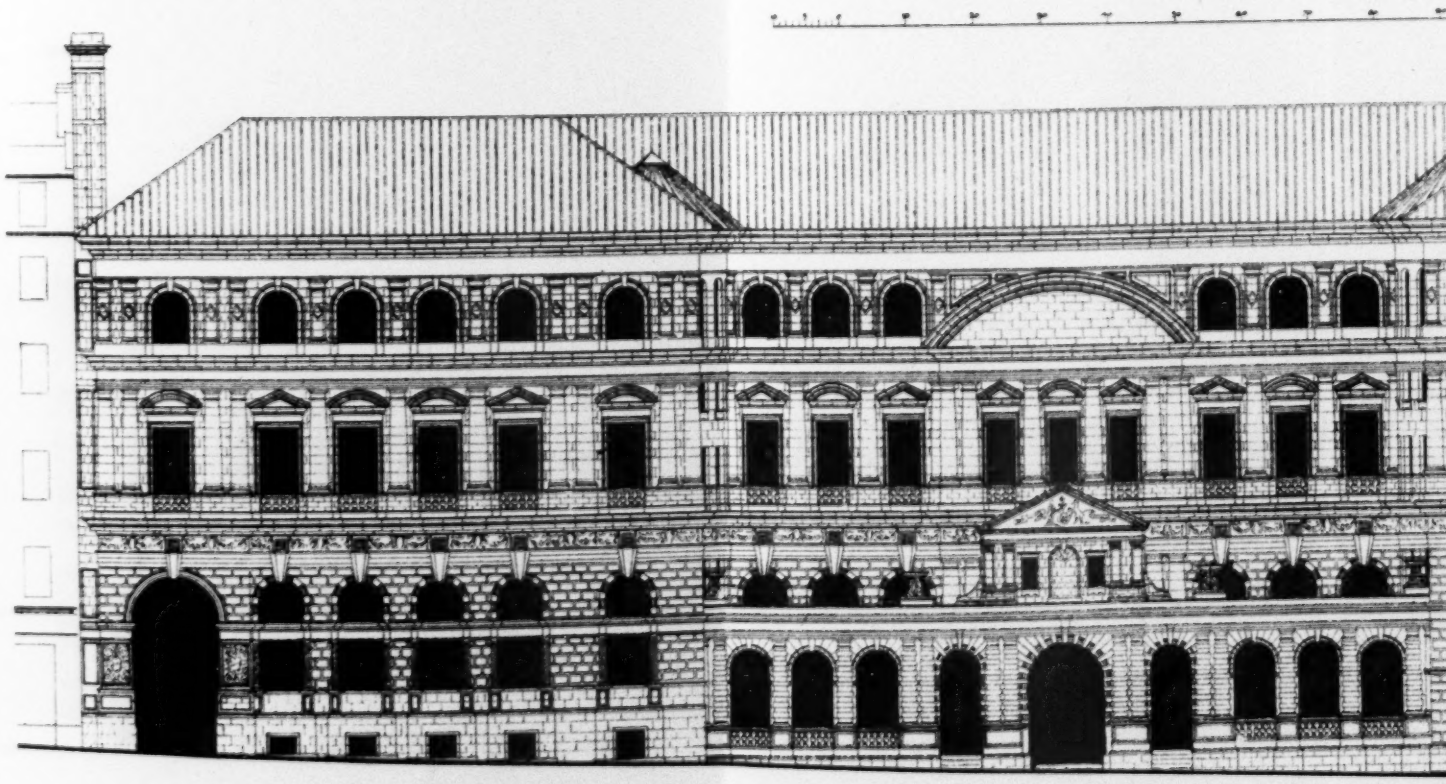


GH STREET

GN BY MESSRS. MORRIS AND HUNT.



SECTION THRO' GRAND STAIRCASE &

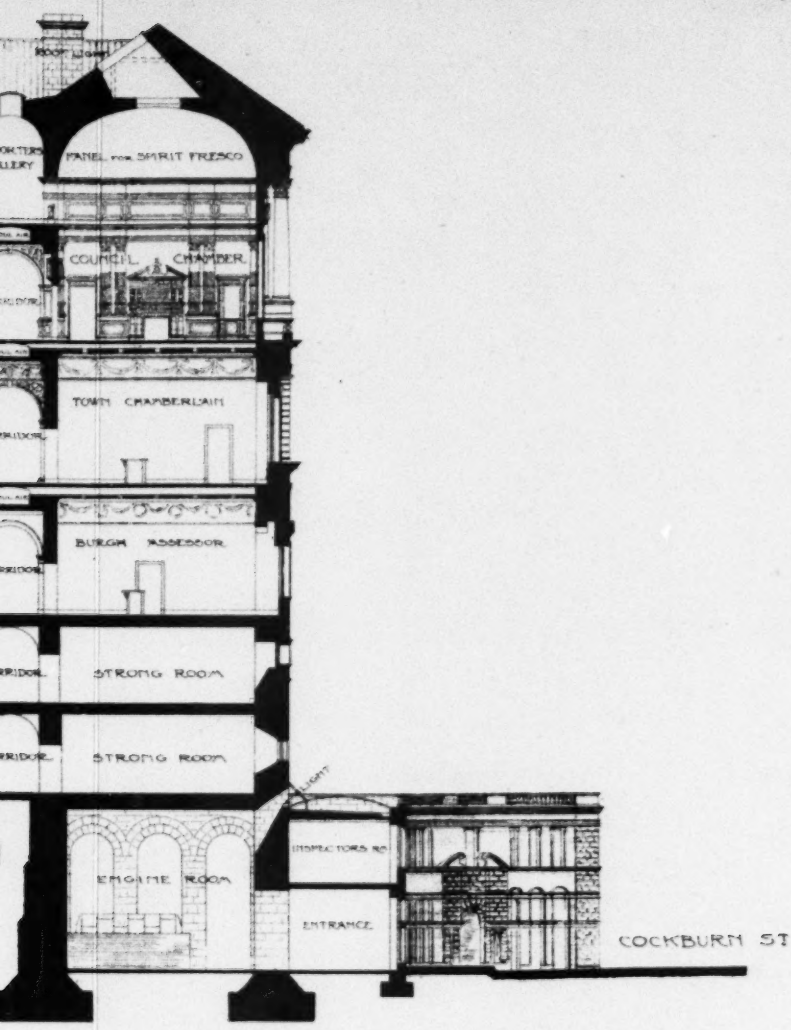


ELEVATION TO H

C. F. Kell Photo-Lith & Printer 8, Furnival St Holborn, London, E.C.

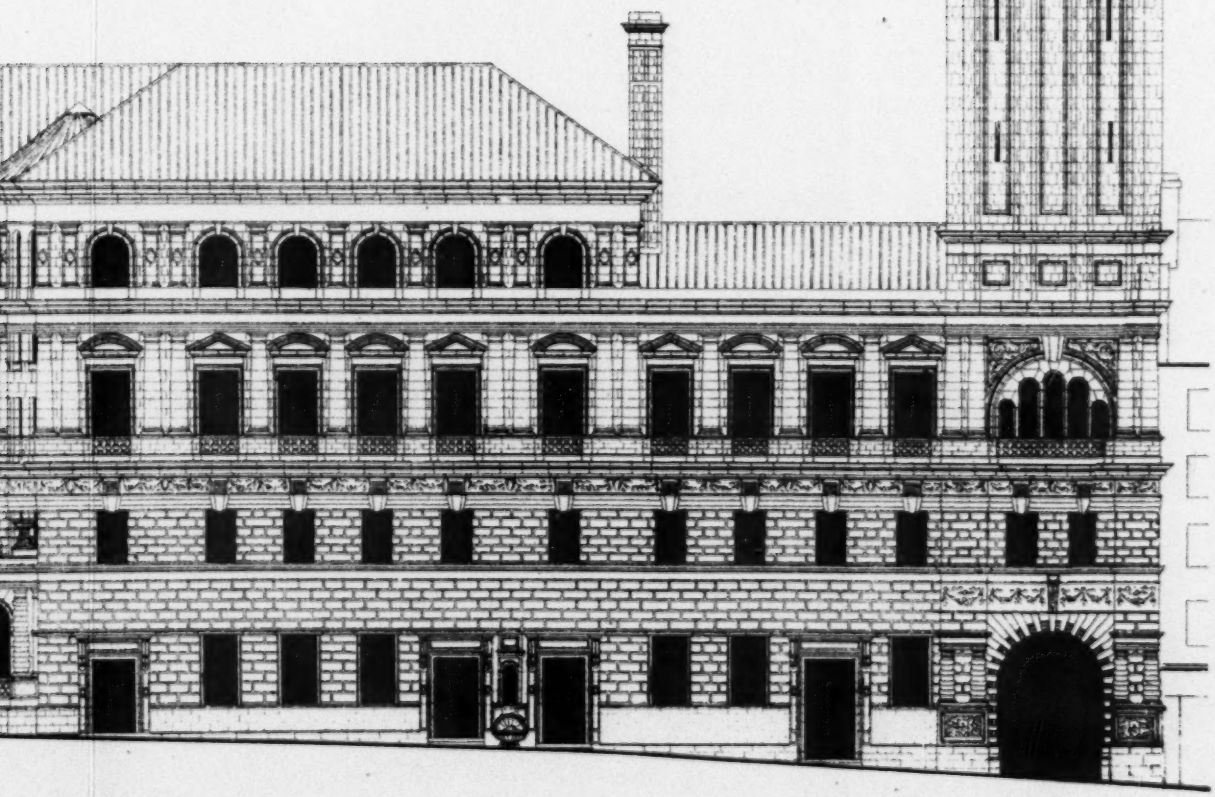
EDINBURGH MUNICIPAL BUILDINGS COMPETITION.—D

1887.



L & COURTYARD

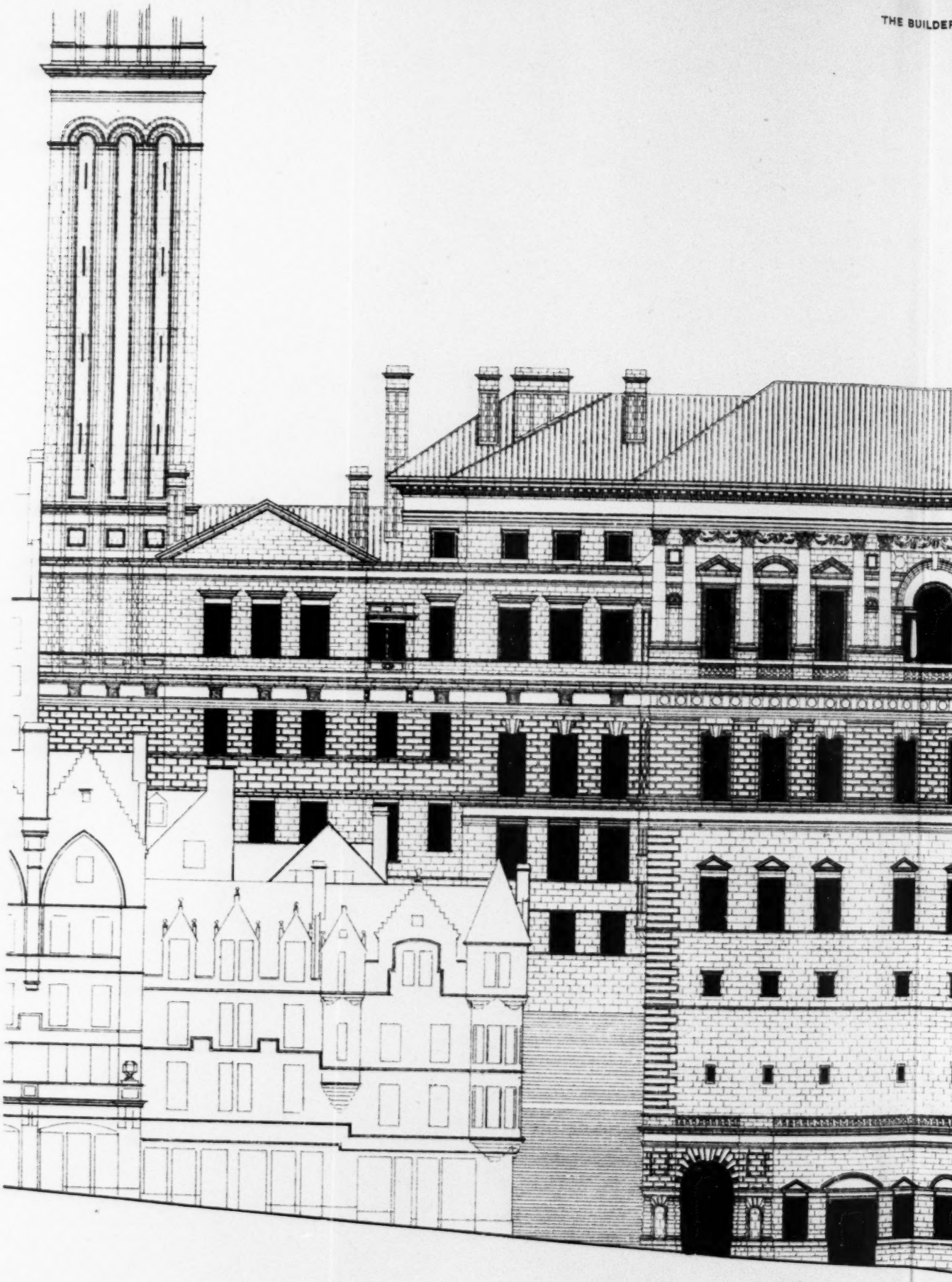
FEET



HIGH STREET

FEET

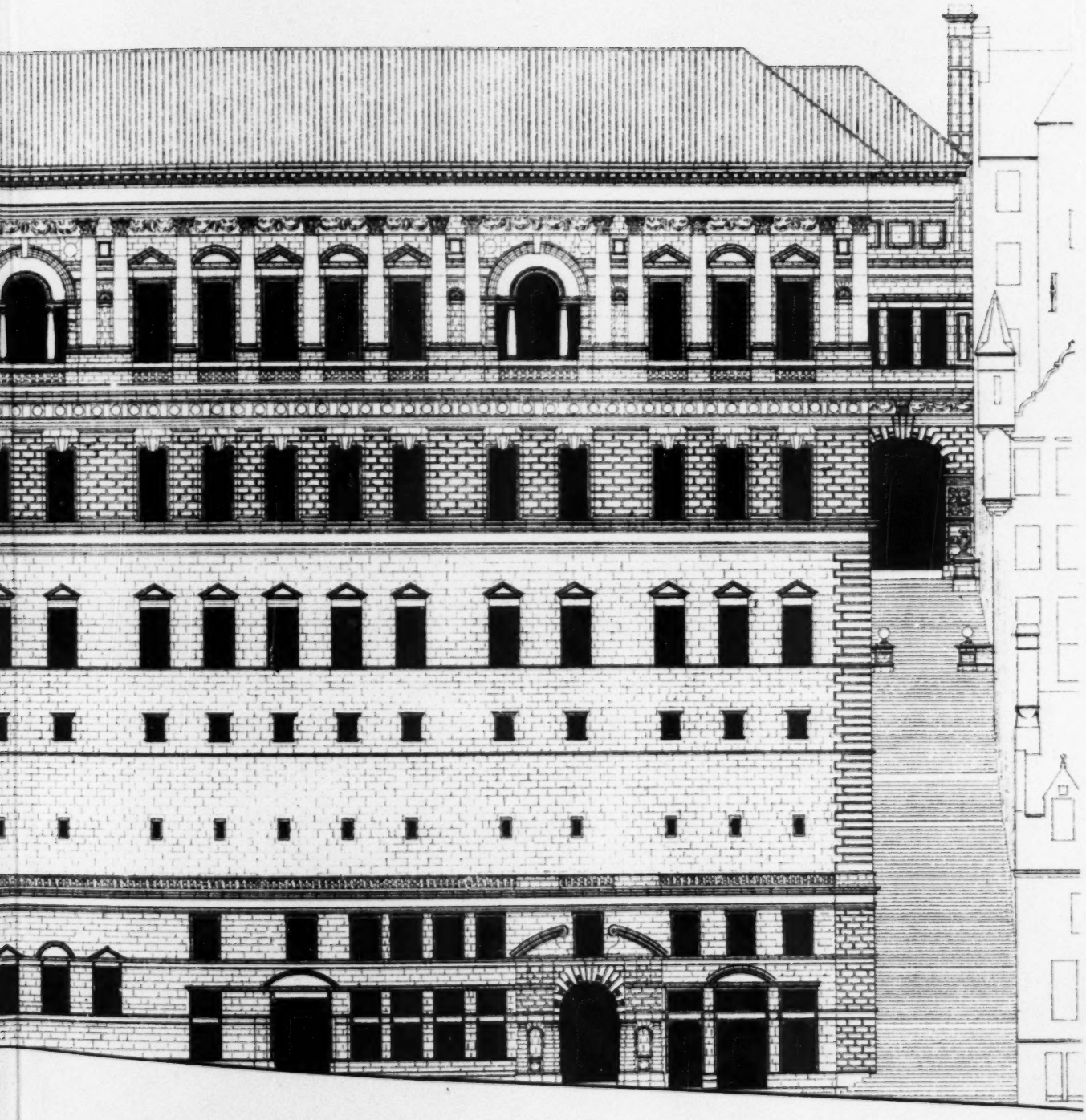
I.—Design by Messrs. Morris and Hunt.



F. Kell Photo Lith & Printer 6. Furnival St. Holborn London, E.C.

ELEVATION TO CO

EDINBURGH MUNICIPAL BUILDINGS COMPET

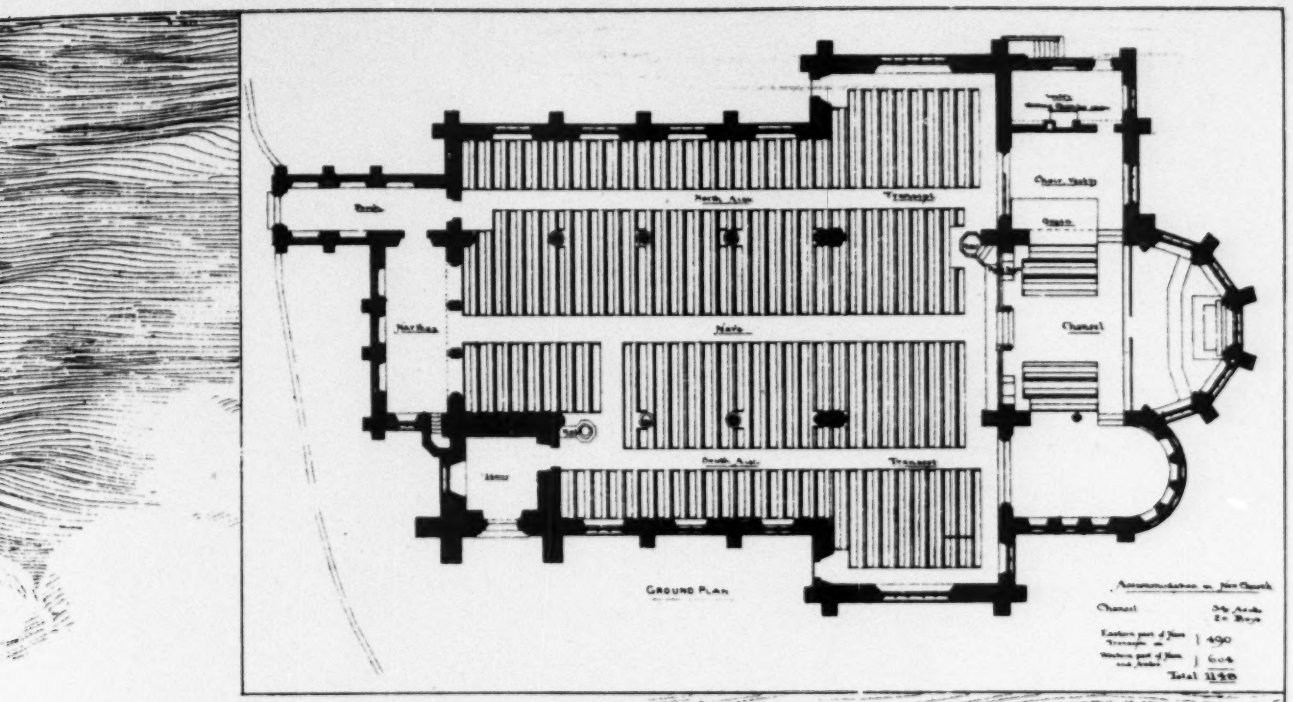


COCKBURN STREET

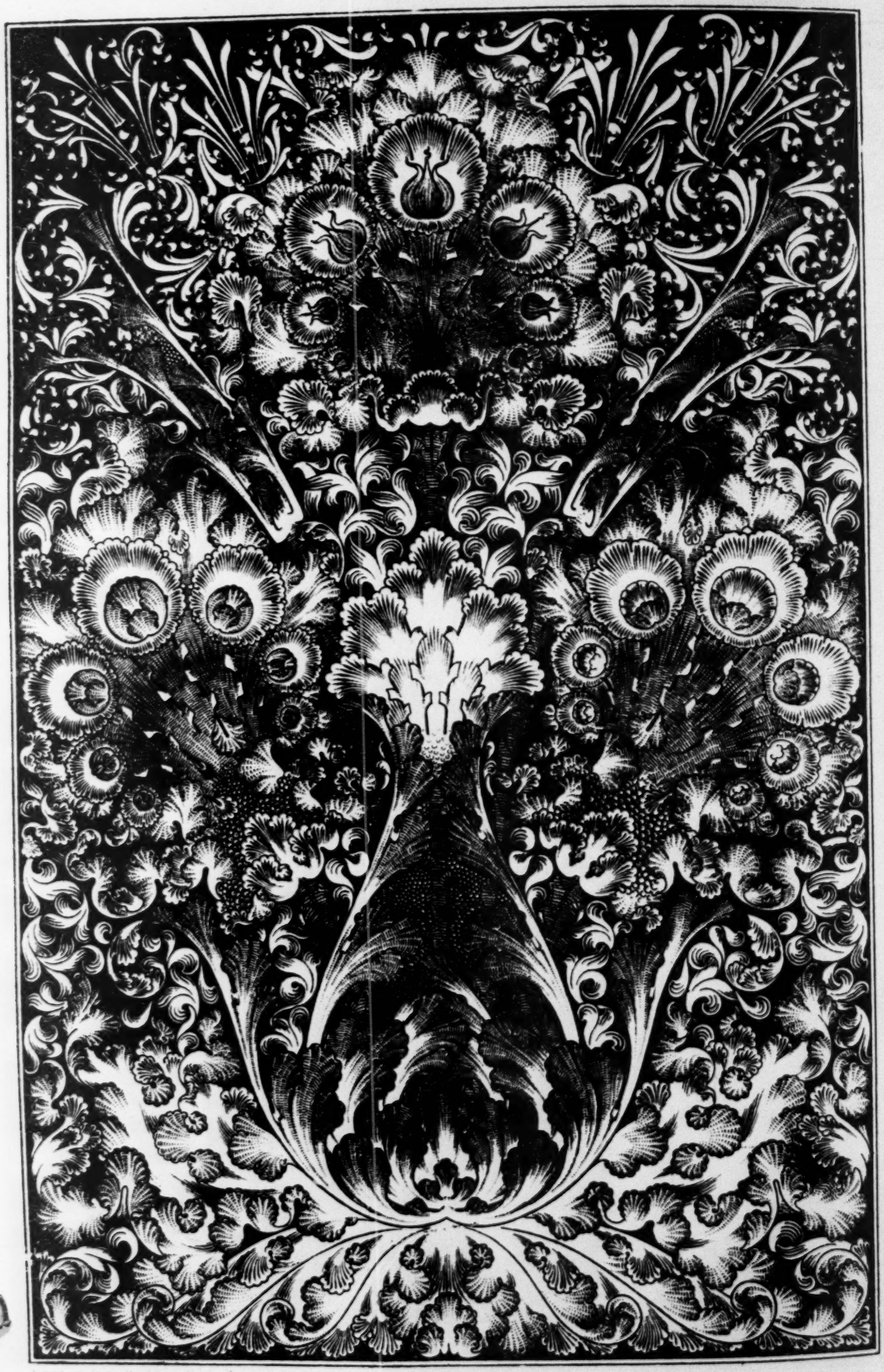
FEET

COMPETITION.--DESIGN BY MESSRS. MORRIS AND HUNT.

CHURCH OF SS. GEORGE AND MARY, BECKENHAM.——M

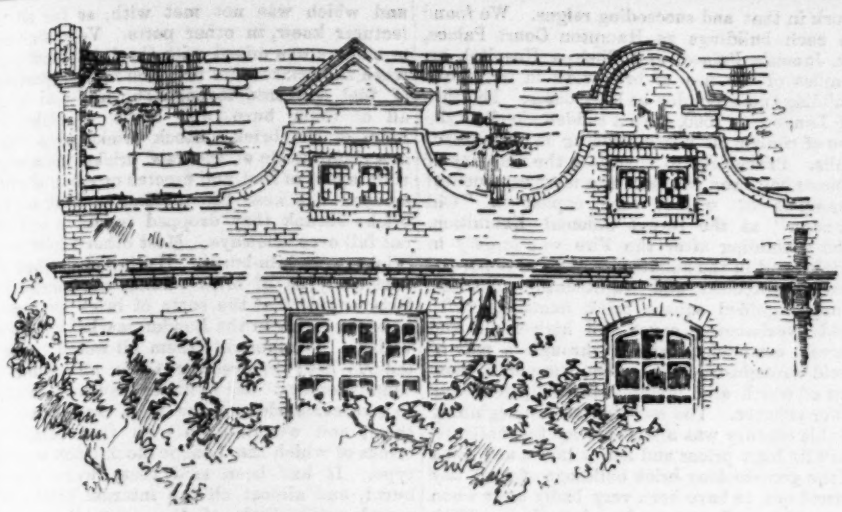


M.—Mr. W. G. Bartlett, F.R.I.B.A., Architect.



MODERN ORNAMENTATION.—By Dr. Chr. Dresser.

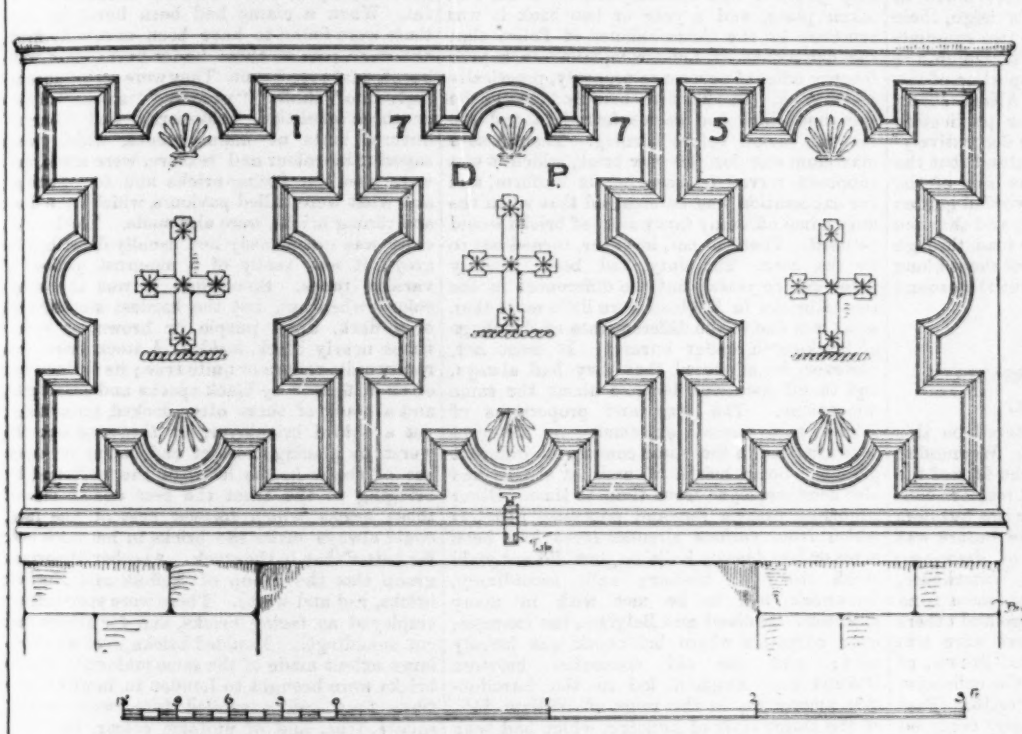
A SKETCH IN SIENA.—By Mr. Reginald Barratt.

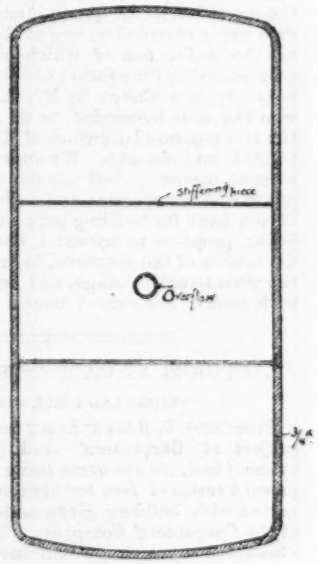


Part of the "Queen Anne" Addition, Fairfax House.
From a Sketch by Mr. J. Alfred Jones.

FURTHER NOTES ON FAIRFAX HOUSE, PUTNEY.

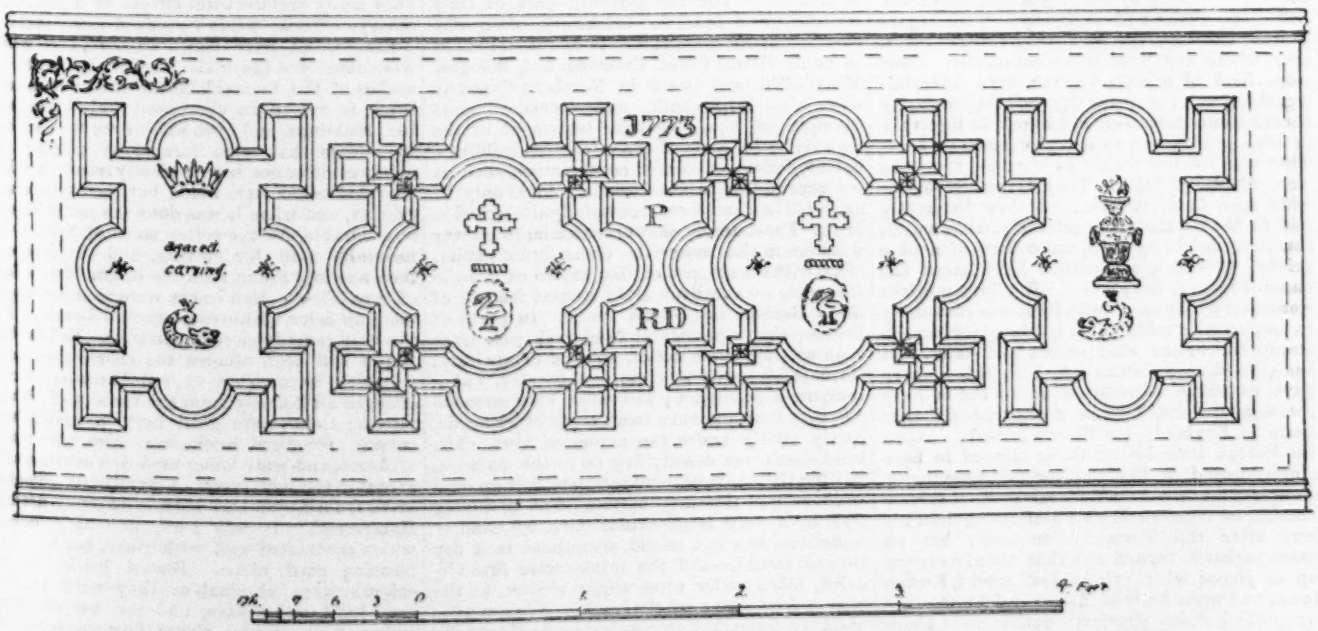
WE give some more facts and sketches about this old house, the demolition of which has excited so much regret. In regard to its supposed occupancy by General Fairfax, the real story we believe to be in this wise:—When king Charles I. lay at Hampton Court, in the year 1647, the Roundhead forces made their head-quarters at Putney, with the double purpose of keeping the king under control and of over-ruling the capital, together with the Parliament. Fairfax's chief officers are said to have met in council around the altar-table of St. Mary's, the parish church by the ferry-stairs. At this crisis Ireton, in his capacity of Commissary-General of Victuals, possibly found lodging at the so-called Fairfax House. That house shortly afterwards passed to one John Pettiward, in whose family,—still large land-owners of the parish,—it for many generations remained. John Pettiward acquired it in virtue of his marriage with Sarah, daughter and heir of Henry White, then of Fairfax House, who





Plan: Half-Scale of Elevation.

Lead Cistern in Yard, Fairfax House.—Drawn by Mr. B. F. Fletcher.



Lead Cistern in Garden, Fairfax House.—Drawn by Mr. E. H. Parkes.

served as sheriff for the county in 1653. Ireton also lodged at Putney House,—dating from 1533,—in the Upper Richmond-road, which was lately demolished. This was the famous Putney School of some generations since, and a reputed home of the Duke of Hamilton, as also of Louise de Querouaille, the Duchess of Portsmouth. Fairfax is said to have stayed here for some months; but there is good evidence to show that the house he *did* occupy was one which, by name of "The Palace," in commemoration of Queen Elizabeth's visit there, stood to the west of old Putney Bridge. That house had been rebuilt, 1596, on the site of a mansion of the Welbecks, by John Lacy, citizen and clothworker, and his Company's arms were carved in the drawing-room ceiling. In 1647 it belonged to the high sheriff, Sir William Wymondsold. It then passed to Sir Theodore Jansen, whose trustees sold the property to Mr. Paul d'Aranda, and continued in possession of his family until about ninety years ago.

The oldest portions of Fairfax House were apparently of no earlier date than say the end of the sixteenth century. The interior woodwork of the oaken panelled room,—"Queen Elizabeth's breakfast parlour,"—is of the Restoration epoch. Additions were made to the main fabric in Queen Anne's reign, their date being recorded on one of the two sun-dials on the walls, one of which is shown in the accompanying illustration of this portion of the house, from a sketch by Mr. J. Alfred Jones, who has also forwarded to us for publication the two measured drawings of the decoratively-treated lead cisterns. We understand that the present possessor had leased the site of the house with its spacious and well-wooded garden at the back for building purposes, and that the lessee proposes to lay out a new road through the middle of the property, to erect shops along the wide street frontage, and cover the ground with rows of low-rented houses.

LECTURES AT CARPENTERS' HALL:

BRICKS AND BRICKWORK.

Professor T. Roger Smith lectured on this subject at Carpenters' Hall on Wednesday evening last, his discourse being the fifth of the present series of free lectures on matters connected with building given under the auspices of the Carpenters' Company. The lecture was illustrated by a large number of drawings, lent by Mr. James Brooks, Mr. Waterhouse, R.A., and Mr. Stevenson, besides some from the collection at University College and others prepared for the occasion. There were also specimens of bricks lent by Mr. Brown, of Norwich and London, and from the collection at University College. Mr. A. Preston (Past Master of the Carpenters' Company) occupied the chair, and there was a good attendance.

The lecturer commenced by giving an interesting historical sketch of the manufacture and use of bricks by the Egyptians, Assyrians, and other nations of antiquity. With regard to the Romans, he said they made bricks everywhere and used them constantly. They were fond of mixing two or more materials together, as, for example, building walls in concrete and inserting brickwork at intervals, in horizontal layers, to act as courses of bond. They also erected buildings of which the walls were wholly of brick. They turned arches of wide span in brickwork, and they frequently laid in their walls, at regular distances apart, courses of bricks on edge, and courses of sloping bricks, to which antiquaries have given the name of herring-bone work. The Roman bricks were interesting as records, for it was customary to employ the soldiers on brickmaking, and to stamp the bricks with names and dates, and thus the Roman bricks found in this country gave us some information as to the military commanders and legions occupying different parts of England at different periods. After the Roman time brickmaking seemed to have almost ceased in England for many centuries. It was true we found remains of a certain number of massive brick buildings erected not long after the Norman Conquest; but on examination it turned out that these were put up at places where there had been a Roman town, and were built of Roman bricks obtained by pulling down previous buildings. About the time of the Tudors, say the reign of Queen Elizabeth, the making of bricks was resumed in England, and many dwelling-houses and some few churches were built of good brickwork in that and succeeding reigns. We found in such buildings as Hampton Court Palace, St. James's Palace, and Chelsea Hospital, examples of the use of brickwork in important buildings near London at later dates. The Fire of London, in 1666, gave a sudden check to the use of timber in house-building in the metropolis. Previously to that date the majority of houses had been of a sort the most ornamental examples of which were copied in "Old London" at the recent Colonial Exhibition. The rebuilding after the Fire was largely in brick; and in the suburbs, in the latter part of the seventeenth and eighteenth centuries, many dignified square brick mansions, with bold overhanging eaves and high roofs and carved ornament, entered through a pair of florid wrought-iron high gates, were built, some few of which still lingered in Hampstead and other suburbs. The war-time at the beginning of this century was a trying time for builders, with its high prices and heavy taxes, and some of the good-looking brick buildings of that day turned out to have been very badly built when they were pulled about for alterations. With the rapid and wonderful increase in population and wealth in this metropolis during the last fifty years a vast consumption of bricks had taken place, and a year or two back it was reported by the Commissioner of Police that the extensions of London equalled in a year seventy miles of new house property, practically all of brick. Bricks were heavily taxed in the war-time which had been referred to, and the tax was levied before burning. There was a maximum size for the raw brick, which it was supposed served to keep bricks uniform, and the expectation was entertained that when the duty came off many fancy sizes of bricks would be used. That had not, however, turned out to be the case. The duty had been entirely taken off for years; but the differences in the size of bricks in England were little more than what was due to the different rate of shrinkage of brick-earth under burning. It must not, however, be supposed that they had always, and in all countries, been of about the same dimensions. The size and proportions of bricks had varied extremely in different countries and in the same country at different periods. Some bricks of unusual shapes had also been employed from time to time. Other countries besides England possessed districts which from various circumstances had been more or less densely built on, but did not yield much stone or timber; and, accordingly, brickwork was to be met with in many localities. Holland and Belgium, for example, were countries where brickwork was largely used; and the old connexion between Holland and England led to the introduction among us, in the reign of William III., of the Dutch style of building, which had been in our own day revived under the rather incorrect title of "Queen Anne" architecture. Another great brick district existed on the plains of Lombardy and the northern part of Italy generally, and beautiful brickwork, often with enrichments in marble, was to be found in such cities as Milan, Pavia, Cremona, and Bologna. Many cities and towns in Northern Germany were also brick-built, and furnished good examples of the successful treatment of the material. In some of these German buildings, indeed, difficult pieces of construction, such as we were in the habit of thinking could only be executed in stone, were successfully attempted in brick. For example, they executed large tracery windows in that material. Great brick gables, often with the stepped outline known as crow's-feet, were an excellent architectural feature of these German brick-built towns. In parts of France, also, ornamental brickwork was from time to time made use of, but not extensively. Good brick earth was not simply clay, but a compound substance; and what was essential was that it should burn hard, or, in other words, partly vitrify under the action of heat. The brick-earth was usually dug up in the autumn, left for the frosts of winter to break it up, and worked up in the early spring. The moulding was to a very large extent done by hand,—sometimes in a wet mould, sometimes in a dry sanded mould,—and the bricks were first air-dried, often under some slight shelter, as the rain or frost damaged them when fresh made; and then when that process had made them solid enough to handle, they were burned, and sorted into qualities. The ordinary, or stock, brick of London and the neighbourhood presented a peculiarity the origin of which was not known, and which was not met with, so far as the lecturer knew, in other parts. Very fine coal or cinders was mixed with the brick-earth, and when the bricks were fired the minute particles of fuel scattered through the material would all of them burn, and serve to bake the heart of the brick. Stock bricks were burnt in a clamp made of the raw bricks themselves with layers of fuel, and erected on earth slightly scooped out near the middle, so that as the bricks shrank they dropped together and did not fall over sideways. Most other varieties of bricks were kiln-burnt. Having described the various types of brick-making machinery, the lecturer said that the sorts of brick that were to be met with in the London market were very varied. To enumerate them all would make a tedious list; to describe them all would be equally tedious. He would endeavour, however, to give some idea of the most conspicuous of them, and would begin with that family of bricks of which the London stock brick was the type. It had been said these were clamp-burnt, and almost all the internal brickwork,—and not a little of the external,—of the metropolis was of stock brickwork. A good London stock brick was an excellent brick for general purposes, but could not be called beautiful. When a clamp had been burnt its contents were found to have been unequally fired, and were part of them under-burnt, part well-burnt, part over-burnt. They were sorted accordingly into "shuffs," "grizzles," "stocks" of two or three qualities, "shippers," and "burrs." Several sorts of malm stocks, which were superior in colour and texture, were made, and were used for facing-bricks and for cutting; and what were called paviours, which were dark and strong bricks, were also made. The London stock was erroneously but usually described as grey; it was really of a pie-crust yellow of various tones. Sometimes it was the same colour when cut, but the hardest stocks were of a dark, dirty purple or brown, or sometimes nearly black, inside. A stock brick was rarely quite square or quite true; its surface was often disfigured by black specks and small pits, and a stack of them often looked uninviting; yet a skilful bricklayer, by throwing out the worst, by placing those of bad colour or much out of shape in the heart of the wall, and by bringing to the front the best end or side of those bricks which formed part of the face, could always make the bricks in his work look far better than in the stack. Another important group was the group of Suffolk and Norfolk bricks, red and white. These were very largely employed as facing bricks, and for arches and cut mouldings. Moulded bricks were also to a large extent made of the same material. These bricks were brought to London in large quantities; they had a sanded face, were mostly square, true, and of uniform colour, but they were usually porous, soft, and absorbent. Still, they were in great demand as facing bricks, and the moulded bricks enabled the architect to produce many architectural effects at a moderate outlay. These fields furnished many sorts of bricks, which were called rubbers, and which were employed (as malm stocks also were) for arches of the more elaborate sort, where each brick is cut to its shape and rubbed true, and for mouldings, and even sometimes for carving. Mouldings that were formed by cutting the bricks could be got more perfectly true than when moulded bricks were used; but the expense was greater, and when it was done the material was less durable, for the softer sorts of brick were naturally used for cutting, and the moulded face was less sound than the original burnt face of any brick. Red bricks were to some extent made in fields within easy reach of London; but the best came from some distance. Red Suffolk bricks had been alluded to; there was a considerable importation of red Fareham bricks, brought all the way from the vicinity of Portsmouth; these were good both in quality and colour. Good red bricks were also now made at Ascot, and were being used to a considerable extent in the metropolis. A strawberry-coloured brick from Luton had been extensively used at Hampstead. It was hard, and of a colour which contrasted well with stone, but not very pleasing used alone. Glazed bricks of all colours were obtainable: they were usually very hard and square, and the use of them where an impervious glazed face was required,—as, for example, in a good stable,—was better than the employment of glazed tiles, in the use of which there was always a possibility of part of the lining becoming loose or falling off.

There was a difficulty in obtaining a large quantity (of some colours, at least) exactly uniform in tint. Bricks with a very hard face, but not glazed, were obtainable. What was called a washing brick was now made in various colours, adapted for the lining of interiors, and there were hard bricks of a very pale straw colour, known as Beart's patent bricks. These bricks had the peculiarity of being pierced with holes about ¼ in. in diameter, passing quite through the brick, and they were extremely hard, partly because these holes permitted the hot air and smoke in the kiln to approach very near to the interior of the brick. The lecturer was of opinion that the glazed or dull qualities of hard bricks might with great advantage be often introduced into London streets. What we wanted was something that would wash. The rough surface of stocks or Suffolk facing bricks caught the blacks in the London atmosphere, and gradually got dark and dull. But a perfectly hard face was washed clean by every shower. To return to the bricks in the London market: we had fire-bricks made of fireclay, and almost vitrified and capable of standing intense heat. These were used for lining furnaces, ovens, flues, &c. Then we had almost, if not quite, as refractory a material in Staffordshire blue brick used,—in various forms,—for paving channels, jambs of archways, &c. There were also small bricks called clinkers, chiefly used for stable-paving. Dutch clinkers, formerly imported largely from Holland, were small, rough bricks laid on edge, and affording a good foothold for the horse. Adamantine clinkers, made of gault clay, were much used; they should have chamfered edges, otherwise they made too smooth a floor for a stable. Many other varieties were obtainable in London, and were more or less used, but these were the most prominent. In many parts of England special varieties of brick were to be found, and every here and there one met with a good brickmaker who was able to produce good moulded or embossed or ornamental bricks, such as those which were supplied years ago by Mr. Gunton, and more recently by Mr. Brown, both of Norwich, or by Mr. Cooper, of Maidenhead. It was of importance to those whose business it was to look after or engage in building operations, that they should early learn what to look out for in each material. He (the lecturer) therefore made no apology for trying to put before his hearers the points of a good brick, and in so doing he should partly quote from a memorandum published now a good many years ago by the Manchester Society of Architects. A good brick was uniform in size; standard, 9 by 4½ by 2½; weight about 7 lb. each, = 110 lb. per foot cube; was rectangular, true-faced, but only one end and one side need be smooth, had no print sinking on either face, but a hollow on one or both beds. When saturated with water, a brick should not absorb more than 20 per cent. of its own weight of water, should absorb it reluctantly, and part with it freely at ordinary temperatures. It should be uniformly burnt, should be sound, free from cracks, flaws, stones, lumps of any kind, but especially lumps of lime; should be of a good colour for its sort (whether red, yellow, or white), should have a metallic clang when two bricks were struck together; when broken should be sound right through; should be tough and pasty in texture, not granular; and should require repeated blows to break it rather than one hard blow (such bricks would withstand cartage and handling best).

So much for bricks. To make brickwork, however, another ingredient was required,—namely, mortar or cement. All mortars, and, in fact, all the cementing materials used (except bituminous ones) in bricklaying had lime as their base, and depended upon the setting quality of quick lime, which had to be mixed with sand or some suitable substitute for it, to make mortars. Limes and cements were far too wide a subject to be dealt with as part of an evening's lecture on another topic, and no doubt they would hereafter form the subject of a lecture or lectures. Ordinary brickwork might be divided into brickwork in mortar and in cement, but there were many qualities of mortar and several sorts of cement. Mortar made with what were called fat or rich limes,—that was to say, nearly pure limes, such as was got by calcining marble or pure chalk, set slowly, with difficulty, and was rarely tenacious. Burnt clay or brick reduced to powder improved the setting of such lime, especially if the two materials were calcined together; so would an admixture of cement. Mortar made with what was known as slightly hydraulic lime,—that was to say, lime containing a small proportion of clay, such as the grey-stone lime of Dorking, Merstham, and that neighbourhood, set well, and was tenacious and strong. Mortar made with hydraulic lime,—that was to say, lime with a considerable admixture of clay, such as the lias lime,—set under water or in contact with wet earth. It was best to use that lime ground to powder, and not to mix so much sand with it as was used with stone lime. A sort of mortar called selenitic mortar, the invention of the late General Scott, had been made use of in many of the buildings of the School Board for London, and was first employed on a large scale in the erection of the Albert Hall. Its peculiarity consisted in the addition of a small dose of plaster of Paris (sulphate of lime) very carefully introduced, and intimately mixed. The result was that the mortar so made set rapidly, and was very hard. It was claimed that a larger proportion of sand could be used with selenitic than with ordinary lime, thus counterbalancing the extra expense occasioned by royalty under the patent, and by the special care required in mixing. When a limestone contained from 20 to 40 per cent. of clay, it became what was called a cement, and its behaviour was different from that of limestones with less clay. Brickwork in mortar would always settle and compress to some extent. Not so brickwork in cement, which occasionally expanded, but was never to be compressed. That quality, and the rapid setting, tenacity, and strength of brickwork in cement made it a most valuable material to use in those buildings or parts of a building where great steadiness and strength were wanted, and in the sewerage and dock work where there was water to contend with. A good many cements made from natural stones used to be employed, such as Medina, Harwich, Atkinson's, or Roman cement. The last named was the only one which was now much employed, except locally. It had the quality of setting with exceptional rapidity, and was on that account sometimes the best material to employ; but for almost every purpose the artificial compound known as Portland cement was preferable. Portland cement was made largely near Rochester. Its materials were simple and cheap. They might, without much departure from the truth, be said to be Thames mud and chalk; but the process of manufacture required care and thoroughness. The article supplied, when of the best quality, had great strength, and was quick-setting, and was far better than what was manufactured from stones in which the ingredients existed in a state of nature. In England we slaked our lime and made use of it while it was fresh; but in Italy and parts of France it was customary to slake the lime long before it was wanted, and to deposit it in a pit and cover it up with earth. In that condition it was left for months,—in Italy for a year,—and when taken out it was stiff, but still a pasty substance. It was beaten, and more water added, and it was then made into mortar with sand. It was claimed for mortar made in that way that it was exceptionally strong.

Now that he had considered bricks and partly considered mortar, it remained to pay some attention to brickwork. The simplest and most familiar work for a bricklayer to do was to build a wall. In doing that his object should be to make it as stout as possible for the thickness, and that stoutness could only be obtained by interlacing the bricks. If they were simply laid on the top of each other the wall would be no more than a row of disconnected piles of bricks liable to tumble down. When the whole were so adjusted that throughout the entire wall the joints in one course should rest on solid bricks and should be covered by solid bricks again,—in short, when the whole should break joint,—then the wall was said to be properly bonded, and had as much stability given to it as it could possibly possess. There were two systems of bonding in use in London, known as "English bond" and "Flemish bond." English bond was the method which we found followed in ancient brickwork in this country. In that system a course of bricks was laid across the wall, showing their heads at the surface, hence called "headers," and next above came a course of bricks stretching lengthways of the wall, called "stretchers," and so on alternately. With the Dutch fashions came in Flemish bond, in which, in each course, a header and a stretcher alternated. In either case, at the corners, a quarter-brick called a closer has to be used in each alternate course to complete the breaking joint. There was not much to choose between these methods where the walls were only one brick thick; but where they were thicker the English bond had a decided advantage, for in walls built in Flemish bond of one and a half brick thickness or more there must be a few broken bricks, or bats, and there was a strong temptation to make use of many. If that took place, the wall was unsound. Many of the failures of brickwork in London houses arose from the external walls, where they were 1½ brick thick, being virtually in two skins; the inner 9 in. did the whole of the work of supporting floors and roof, and when it began to fail, the outer face bulged off like a large blister. He had known cases where that had occurred, and where there was no header brick for yards, so that one could pass a 5 ft. rod into the space between the two skins and turn it about. That was rather less easy to accomplish with English bond, and there were other advantages in the use of that bond which made it decidedly preferable, and it was now coming back into very general use. There were some odd varieties of bond, such as garden-bond and chimney-bond; but of these he only wished to draw attention to what was called cross-bond. The name was not quite a happy one. Diagonal-bond was hardly better. The thing itself was to be often met with on the Continent, and it was almost unknown here; but it would be worth introducing, as the effect of it was very good. French cross bond, otherwise diagonal bond (*liaison en croix*), was English bond, but with the peculiarity that in every fourth course one header was made use of in the stretcher course at the quoin. The result was that the stretchers broke joint with each other, and all the joints ranged themselves in diagonal lines, and if in any part of the work headers of a different brick were introduced, the appearance of a cross was at once brought out; and even without that, the diagonal arrangement of joints was very perceptible and pleasing. The lecturer next entered in detail into a description of the many other kinds of work which the bricklayer has to do, such as the formation of fireplaces, flues, and chimneys, and the execution of underpinning, &c. He described very fully the methods to be observed in the construction of arches, treated of the question of strength of brickwork, and, in conclusion, enumerated some of the best specimens of modern brickwork produced by architects and engineers.

The concluding lecture of the series will be given on Wednesday evening next, when Professor A. H. Church, M.A., will discourse of "Wood: its Chemistry, its Decay, and its Preservation."

ARCHITECTURAL SOCIETIES.

Edinburgh Architectural Association.—The usual fortnightly meeting of this Association was held in the Professional Hall, George-street, last week, when Mr. Scott Dalgleish read a paper on "Trondhjem Cathedral, with special reference to its Restoration." After sketching the rise of the ancient capital of Norway, Trondhjem,—in German Drontheim, that is, Throne-home,—the paper referred to the career of St. Olaf, to whom the cathedral is dedicated. Both the town and the church had strong claims on the regard of Scotsmen, seeing that for several centuries,—from the middle of the ninth till the very close of the fifteenth,—the Bishops and Archbishops of Trondhjem were the ecclesiastical superiors of the Bishops of Orkney and of the Bishops of Sodor and Man. The striking fact was that the ecclesiastical supremacy continued for two hundred years after the civil jurisdiction of the kings of Norway over the Scottish Islands had been given up. The fame of St. Olaf, which yearly attracted many pilgrims to his shrine, caused the extension of the town, and led to the erection of the cathedral. The building was begun by Olaf III., who reigned from 1066 to 1093, and who founded the bishopric of Trondhjem. His church corresponded with the choir and the chancel of the present cathedral. The transepts and the chapter-house were the work of Eystein, the third Archbishop, who ruled from 1158 to 1188. The style of archi-

tecture down to that date was the Romanesque. Eystein's successors, between 1188 and 1248, rebuilt the whole of the eastern part of the church in the English Pointed style. That accounted for the mingling of Romanesque with Early English features, which was the most noteworthy fact in the architectural character of the edifice. The fourth and last period in the history of the original building dated from 1248, when the nave was begun by Archbishop Sigurd. Before the close of the thirteenth century the completed church must have stood forth in all its splendour. Its period of decadence followed quickly on its completion. It was destroyed by fire in 1328, and on four other occasions between that year and 1719 it suffered from "the devouring element." It suffered still more from the Reformers who committed assault and battery upon it in their efforts to adapt it as a place of Protestant worship. At the beginning of the present century, the nave was a roofless ruin; the transepts were fitted up with galleries and wooden pews as a parish church; and in the other parts of the building the delicately-carved stone-work was obscured by plaster, paint, and wooden partitions. The towers, the statues, the altars, the rose-window in the western gable, were gone. The present restorations were begun in 1869, and already good progress has been made, but so elaborate was the scale on which the work had been projected that it was expected to extend over other thirty or forty years. The chief features in the restoration of the octagonal choir, of the chapter-house, and of the chancel, were described in detail, and were illustrated by beautiful photographs. The restoration was being carried out on the soundest principles, the old models, both in plan and in detailed ornamentation, being strictly followed. It had been undertaken as a national enterprise, and its cost was estimated at not less than 250,000*l.*, drawn partly from Government grants and partly from local and private contributions. The present grant amounted to 2,250*l.* a year, while a sum of 1,125*l.* a year was drawn from the profit of the Savings Bank of Trondhjem. The Norwegians were, on the whole, a poor people, and that they should voluntarily tax themselves to that extent for the erection of a national memorial, was, the lecturer remarked, a noble testimony at once to their intelligent liberality, to their patriotism, and to the depth and correctness of their devotional feeling.——On Saturday afternoon last, the members of the Association, to the number of about eighty, visited the new Municipal Buildings at Glasgow, which are now nearing completion. The visitors were conducted over the buildings by the architect, Mr. W. Young. We gave a view of the principal elevation of the buildings in the *Builder* for Nov. 11, 1882.

Glasgow Institute of Architects.—The annual dinner of the Glasgow Institute of Architects took place on the 26th ult., in the Royal Hotel, when a company of about forty sat down. The chairman was Mr. David Thomson, and the croupiers Messrs. W. F. Salmon and James Sellars. The President and Council of the Edinburgh Architectural Association; the President, Vice-President, and Secretary of the Glasgow Architectural Association; Mr. William Young, architect, London; and other gentlemen, were present as guests. In proposing "The Glasgow Institute of Architects," the chairman made an interesting speech, calling attention to some of the subjects the Institute had had under consideration during the past session. The toast of "The Lord Provost, Magistrates, and Town Council" was proposed by Mr. William MacLean, and replied to by Mr. W. F. Salmon; "Kindred Societies" was proposed by Mr. J. J. Burnet, and responded to by Mr. Blanc, President of the Edinburgh Architectural Association, and Mr. M'Nab, President of the Glasgow Architectural Association; "The Allied Arts" was given by Mr. T. L. Watson, and responded to by Mr. D. W. Stevenson, R.S.A., sculptor. Mr. Young's health was proposed by Mr. David MacGibbor, of Edinburgh, and responded to by that gentleman.

Glasgow Architectural Association.—The last of the present series of lectures was delivered on the 23rd ult., by Mr. T. L. Watson, F.R.I.B.A., his subject being "The Crypt of Glasgow Cathedral." The President, Mr. M'Nab, occupied the chair. After some introductory remarks on the unique position among the crypts of British cathedrals held by the subject of his paper, the vaulting ribs, as perhaps the most interesting feature, were considered in detail. The lecturer congratulated the members on their intention of fully measuring and delineating the whole cathedral. At the conclusion, after some remarks from Mr. Gildard, a vote of thanks was awarded to Mr. Watson.

Manchester Architectural Association.—At a meeting held at the Diocesan Buildings last week, Mr. Frank Mee, Vice-President, in the chair, the following officers were elected for the session 1887–1888:—President, Mr. A. H. Davies-Colley, A.R.I.B.A.; Vice-Presidents, Mr. Frank Mee and Mr. F. R. L. Edwards; Committee, Messrs. F. W. Ward, P. E. Barker, T. Chadwick, A.R.I.B.A., E. Hewitt, A.R.I.B.A., J. H. Woodhouse, W. Perry, H. E. Stelfox, W. M. Law, and J. Horsfall; Treasurer, Mr. A. H. Davies-Colley; Librarian, Mr. J. S. Hodgson; Registrar, Mr. Frank Mee; Hon. Sec., Mr. J. D. Mould. Mr. Stelfox then read a paper entitled "The Work of the Association," in which he criticised its doings and questioned if it was fulfilling to the best of its abilities the objects for which the Association was formed. A discussion followed, in which the following members took part:—Messrs. F. W. Ward, R. Booth, A. Leresche, J. A. Coe, H. Dolphin, and the Chairman.

CASE UNDER THE METROPOLIS MANAGEMENT AND BUILDING ACTS, 1882.

AT the Lambeth Police Court, Mr. J. P. Smith, builder, of Coleman-road, Camberwell, was summoned by the Metropolitan Board of Works for that, at Dowlas-street, Camberwell, he did fail to fulfil the conditions annexed to the consent of the Board to the erection of houses in the said street, and dated the 27th day of March, 1882, by not erecting the houses in question in conformity with the letter of application, and as shown on the plan accompanying it, contrary to 45 Vic., c. 14, s. 9.

Mr. Thomas Burton, solicitor, appeared for the Board, and Mr. Forrest Fulton, M.P., and Mr. Bouverie for the defendant.

Mr. Burton stated the facts were as follow. The defendant had applied to the Board for their consent to the erection of houses in Dowlas-street, beyond the general line of buildings in that street. After the consent had been given, he formed a new street, called Rainbow-street, two of the houses of which had side windows in that street, but the front doors were in Dowlas-street; and this he had done in total disregard of the plan, as assented to by the Board as to Dowlas-street. He called Mr. Millward, the surveyor of the Board, who proved these facts.

Mr. Fulton, for the defence, said he relied upon the De Vere Gardens case, as being a case on all fours with the present one, and asked for the summons to be dismissed, with cost.

Mr. Chance, the magistrate, said he would consider the case of the De Vere Gardens, and adjourned the matter for that purpose, but he did not think it applied.

Upon the adjourned hearing, Mr. Chance, in giving judgment, said the De Vere Gardens case did not apply to the present case, and he should fine the defendant 40*s.*, and 3*l.* 3*s.* costs.

"A BOOK ON TIMBER WANTED."

SIR,—Referring to the letter in your last number [p. 484] on this subject, it may be as well to remind your readers of "Laslett on Timber and Timber Trees" (Macmillan).* Of course, Barlow's work is well known. New books will add little to our knowledge without reliable experiments on timbers of the scantlings used in practice. That the constants derived from small scantlings are misleading, and therefore useless, may be readily demonstrated by comparing them with the actual breaking-weight of beams, as shown by any of the existing experiments on those of ordinary size. For instance (Clark), a sound red deal beam, 6 in. by 6 in. and 7 ft. 6 in. between the supports, broke with a weight in the centre of 65¾ cwts. Taking Hurst's formula, we have $W = \frac{C\,bd^2}{L}$, where C is stated to be 4 cwts., b, d, breadth and depth in inches, and L length in feet. Result, 115·2 cwts.

Again, taking Barlow's figures: S = 1,200 lb., whence as C = 4 S, we have $\frac{4 \times 1{,}200}{12} = 3{\cdot}57$ cwts. The division by 12 is consequent on length being taken in feet. Result, 103 cwts.

It is somewhat surprising that the handbooks continue to give these high constants, as it is perfectly well known that those derived from selected pieces 1 in. or 2 in. square are entirely inaccurate for larger scantlings, even of the best timber. In Molesworth, twenty-first edition, p. 122, K is given equal to 14 cwts. for deal; and as K is the same co-efficient as Barlow's S, 4 K = 56 cwts., which, divided by 12 (the length here being in inches), gives 4⅔ cwts., yielding a still higher result.

Now Stoney says "The few experiments on large timber indicate that the values of S must be reduced to very little more than half those given in the table when applied to girders of large size, such as occur in ordinary practice." Again, Col. Seddon, "Builder's Work," Appendix 3, says,—"I have discarded all the records of experiments made on pieces under 2 in. square as not only untrustworthy, but actually misleading."

A few words may not be deemed superfluous on the various moduli in use. One is obtained from the breaking-weight of a beam 1 in. square and 12 in. long, loaded in the middle and supported at each end. Let us call this m. Another is the "*modulus of rupture*" M or f. This is the case of a beam loaded as above $= \frac{3}{2}\frac{\text{WL}}{\omega d}$ (using the symbol ω for area of cross section or bd). The first modulus m is $\frac{1}{18}$ of M or f, the modulus of rupture.

Another is S, the "*coefficient of rupture*," which is obtained from the breaking weight of a cantilever 1 in. square and 1 in. projection. This applied to a beam loaded in the middle and supported at each end $= \frac{\text{WL}}{4\omega d}$

The constant C being equal to 4 S for a beam as above, we have to sum up,

$$C = 4S = \frac{2}{3}f = 12\,m.$$

If the example we commenced with be taken, it will be found that C is from experiment 29 cwts., the length being taken in inches, or if in feet $\frac{12}{12} = 2\frac{5}{12}$ cwts. in lieu of 3·57, 4, or 4⅔ cwts.

The discrepancy in the constants for small and large scantlings is doubtless due to the fact that wood, owing to the existence of knots and the manner of its growth, is not isotropic. With respect to deflection, that of the 6 in. by 6 in. beam was 0·1 in. for every 6 cwt.

The deflection of a piece of spruce 4 in. by 12 in. and 17 ft. span was (according to another author) 0·13 in. per 1,000 load. The further consideration of this, however, would involve another modulus, that of elasticity.

WILLIAM DUDGEON.

KITCHEN BOILER EXPLOSIONS AND SAFETY VALVES.

SIR,—I noticed some few weeks ago that in reporting one of these explosions you strongly advocated the use of safety-valves as preventives. I think it would be useful to your readers if you and some of your practical subscribers would give considered opinions on the matter at greater length. My remarks are confined, of course, to close boilers, each forming part of what is called "low pressure" hot-water circulation, otherwise hot-water circulation with an open relief pipe or open tank at the highest point.

I presume that the best is a "dead-weight" safety valve, and that it should be fixed in a position where it may be free from the corroding action of fire or smoke, and not liable to contact with cooking utensils, or other accidental interference; if so, it should not be fixed on the boiler itself, but as near to it as possible. A fixing to project from the front of the chimney-breast over the mantel-shelf, or from the side of one of the projecting jambs is, therefore, indicated as suitable. I also conceive that it is not good to fix on the flow or return pipes, as these so frequently have their internal diameters reduced by the lime firring from hard waters, so that a separate short non-circulating pipe should be taken from the boiler direct to the safety-valve.

Now, having got our safety-valve, let us see what are the objections to it. If it be not looked to, lifted, and cleaned at proper intervals of time, it is likely to set fast and be of no use; but if it is lifted or the weights raised for this purpose, or by reason of meddling curiosity by a servant ignorant of its action, the servant will be instantly scalded. On the other hand, if it be covered and locked up, the probability is that no one will attend to it.

But what is the use of the safety-valve at all? The most common cause of these explosions is the irruption of water into a highly-heated empty boiler, the consequence of which is that the boiler, suddenly cooling, contracts unequally and ruptures,

* An admirable work, but not exactly the kind of book suggested in Mr. Aitchison's letter.—ED.

at the same time that an enormous volume of steam is evolved, which the open circulation pipes and the safety-valve cannot, either separately or combined, allow to escape quickly enough to prevent its expansive force from hurling the pieces of the boiler in every direction.

The commonest case is, that the supply of water is stopped by the freezing of the return, or supply, pipe; the boiler then becomes emptied either by drawing off the water or by evaporation by means of the fire, or both. The boiler gets red hot, the supply-pipe thaws, and the water suddenly rushes in; then the explosion, which no safety-valve will prevent.

Another case is that the water companies in some districts frequently shut off the supply at night, and if it be turned on again when the boiler is empty and red-hot, then, of course, a similar explosion.

Yet another case. When houses become untenanted, the water companies *cut off* the supply altogether. In one such case, when the house was let again, a *plumber* ("expert," no registered plumbers then) was employed to do some work in the house, and to meet the company's men, who were to restore the connexion of house supply-pipe with the company's main. The plumber, arriving early, made himself comfortable by lighting a fire in the kitchen range. Bricklayers had been before him, and finding no other water for their work in the house, drew off what there was in the boiler, and so emptied it. Mr. Plumber then makes it red hot; the water company's men next connect the pipe, and turn on the water whilst the plumber is in the kitchen, boiler explodes, and he pays with his life the penalty of either his ignorance or his thoughtlessness.

I take it that a safety-valve is good to put on, not to prevent an explosion, but only so that if an explosion does occur, it can be pointed out to the coroner as evidence that every precaution had been taken. But the risk of scalding from intermeddling with it is sufficient, I think, to outweigh any possible advantage.

Note also that safety-valves do not prevent explosion of engine steam-boilers, when they are allowed to get hot from absence of water, and then are suddenly filled with that fluid.

Fusible plugs, thin copper discs, and safety draw-off cocks are all equally ineffectual against the kind of explosion above described, and they sometimes awkwardly act at improper times, and flood the house with hot water.

The precautions to be taken to prevent explosions are (1) never to have a draw-off tap in the boiler; the lowest draw-off should be on one of the circulation pipes at a height above the level of the top of the boiler. When the draw-off tap is thus fixed, the boiler cannot be readily emptied, and whilst there is water in the boiler, it cannot get red hot. [This does not, of course, prevent the fixing of a special emptying-pipe, with screwed nipple or cap for use only when the apparatus is under repair, or is being cleaned.] (2) Immediately it is discovered that there is a stoppage of cold or hot water supply in the house, draw the fire, and discontinue to draw water from any of the hot-water cocks. (3) Before resuming the fire in the boiler range, see that the cold-water supply is restored, and that the boiler and pipes and tanks of the hot-water system are full of water.

ROBERT WISTON.

The Assistant Architect, Metropolitan Board of Works.—At the meeting of the Metropolitan Board of Works on the 25th ult., the Works and General Purposes Committee presented a report as to increases in salaries in the Architect's Department, their first recommendation being that the salary of Mr. John Hebb, the Assistant Architect, be increased from 600*l.* to 700*l.* a year. Mr. Edwards, the deputy chairman of the Board, moved the adoption of the recommendations of the Committee, whereupon Mr. T. W. Williams moved that the recommendation *re* Mr. Hebb be referred back for further consideration, as it had been somewhat sprung upon the Board. Mr. Shepherd seconded this amendment. Mr. Lindsay observed that, in agreeing to the increase to Mr. Hebb, he had been animated with a feeling that Mr. Hebb had some claim on the Board (hear, hear). Mr. J. Jones thought the matter should go back. These were not the times to give well-paid officers an increase of salary (laughter). Mr. Jolly said he hoped the Committee's recommendation would be agreed to, and Mr. Selway said he thought it only fair that Mr. Hebb should be recognised in the manner proposed by the Committee. The amendment was negatived by twenty to eleven, and the Committee's recommendations were agreed to. At the same meeting of the Board it was resolved that Mr. Hebb and Mr. F. W. Goddard be paid 105*l.* each for additional duties discharged by them between the date of the death of Mr. Vulliamy, the late Superintending Architect, and the appointment of his successor, Mr. Blashill.

PROVINCIAL NEWS.

Plymouth.—At a recent meeting of the Plymouth Town Council, it was resolved to complete the southern block of the new market buildings before proceeding with any part of the northern block, so that the proposed widening of Market-place and East-street may be carried out, and thus obviate the necessity for making a carriage-way through the market from Market-place to Cornwall-street. At the same meeting of the Council it was resolved to call in Mr. Baldwin Latham to advise the Council on the sewerage scheme for the Western District, and on the other drainage requirements of the town.

Ramsgate.—It is proposed to make a new "Jubilee" road to connect the two cliffs in Ramsgate, and the President of the Board of Trade (Lord Stanley), together with Mr. H. G. Calcraft (Permanent Secretary), and Mr. C. Cecil Trevor (Assistant Secretary, Harbour Department), and other gentlemen, visited Ramsgate a few days ago in reference to the proposed improvement in the approaches to the Cliffs and Sands, which, it is asserted, will interfere largely with the harbour property if carried out. The Mayor (Alderman W. F. Pygott) and Councillor Pearce (Chairman of the Sands and Cliff Approaches Committee), on behalf of the Town Council, and Capt. Jones (Harbour Master), Mr. G. Keyte (Harbour Engineer), Mr. W. A. Hubbard (Town Clerk), and Mr. W. C. Barley (Borough Surveyor), were also in attendance. The interview was of a purely private character.

Southport.—On the 24th ult. Major-General Hutchinson attended at Southport for the purpose of inspecting, on behalf of the Board of Trade, the new tramways constructed by the Birkdale and Southport Tramways Company, extending their system to Birkdale South, in substitution of the present omnibus service. The whole of the works have been carried out in accordance with the plans, &c., prepared by and under the superintendence of the company's engineer, Mr. C. A. Atkinson, of Liverpool, by Mr. William Winward, contractor, of Wigan. The tramway has been constructed in a substantial manner with concrete foundations, cast-iron sleepers, steel rails and fastenings, best Haslingden paving grouted in asphalte, the paving sets being specially dressed upon the ground, and the roadway for the whole length of the tramways widened and repaved. The district served by this extension is rapidly increasing in population, building operations being very brisk at present, according to the *Liverpool Daily Post*.

CHURCH-BUILDING NEWS.

Bamber Bridge (near Preston).—St. Saviour's Church, Bamber Bridge, near Preston, has lately been consecrated by the Bishop of Manchester, after enlargement. The church was built in 1837. Plans were made in 1876 for an extension by Mr. Myres, but the project was postponed until 1881, when the matter was again taken up, and in May, 1886, the tender submitted by Mr. Charles Walker, contractor, of Preston, was accepted, amounting to 2,631*l.*, but the total outlay, including fittings and all contracts, amounts to close upon 3,000*l.* The additions comprise a spacious chancel, with circular apse, lighted by nine windows; north and south transepts; a spacious organ-chamber on the north side; and a vestry on the south. The chancel is fitted up with roomy choir-stalls in selected pitch-pine, and the floors are laid with Minton & Co.'s encaustic tiles. The roof is circular and open-timbered. The old nave roof has been boarded diagonally. The nave and transepts have been fitted up with new pitch-pine open benches, having easy sloping backs. A new baptistery has been formed under the present tower and spire at the west end. The church is well lighted and ventilated, and the present accommodation is for 791 persons. The whole of the works have been carried out under the supervision of Mr. T. Harrison Myres, A.R.I.B.A. (Messrs. Myres, Veevers, & Myres), Preston, Mr. John Yates, of Bamber Bridge, acting as clerk of works.

Croydon.—It is proposed to renovate the interior of Christ Church, Broad Green, Croydon, and to carry out a general scheme of decoration from designs by Mr. C. A. Monday, A.R.I.B.A.

Gnaton (Devon).—The *Western Morning News* reports that under the title of St. Mary's, Gnaton, a chapel adjoining Gnaton Hall, the residence of Mr. Michael Williams, was opened on the 24th ult. by the Bishop of the diocese. It is really a private chapel attached to the mansion, but wishing to make it as useful as possible to his neighbours, who, like himself, are some two miles from the parish church of Newton Ferrers, Mr. Williams has kindly made a separate public approach to it, and opened its services to all who wish to attend them. Mr. Geo. Fellowes Prynne is the architect of the chapel, which is erected on the north side of the hall. The roof is covered with red Broseley tiles, and surmounted by a bell turret. The walls are of a local stone of a warm bluish tint from Mr. Williams's own quarries, the dressings being, in the exterior, of Box Ground, and in the interior of Corsham Down stone. The contractors for the building were Messrs. Lapthorn & Goad, of Plymouth; the carved woodwork was done by Messrs. Wippell & Co., of Exeter; the brass and iron work came from Messrs. Singer & Co., of Frome; the stained-glass windows are by Messrs. Clayton & Bell, of London; the marble work is by Messrs. J. & E. Goad, of the Phœnix Works, Plymouth (who, in regard to the Kitley marble dado, which runs all round the interior of the chapel, were joined by Mr. Gulley, of Yealmpton); and the decoration of the roof was carried out by Messrs. Kingcome, of Yealmpton.

Hoghton.—Through the liberality of Sir Charles de Hoghton, Bart., who has rebuilt the tower from designs by Mr. Birtwistle, architect, of Blackburn, the ancient parish church of Hoghton has been presented with a new clock, specially made by Mr. J. W. Benson, of Ludgate-hill. It has gun-metal wheels, steel pinions, and Graham's dead-beat escapement, shows time on two copper dials, 5 ft. 6 in. diameter, strikes the hours on a tenor bell of 13 cwt., and chimes the celebrated Cambridge quarters on four smaller bells.

The Student's Column.

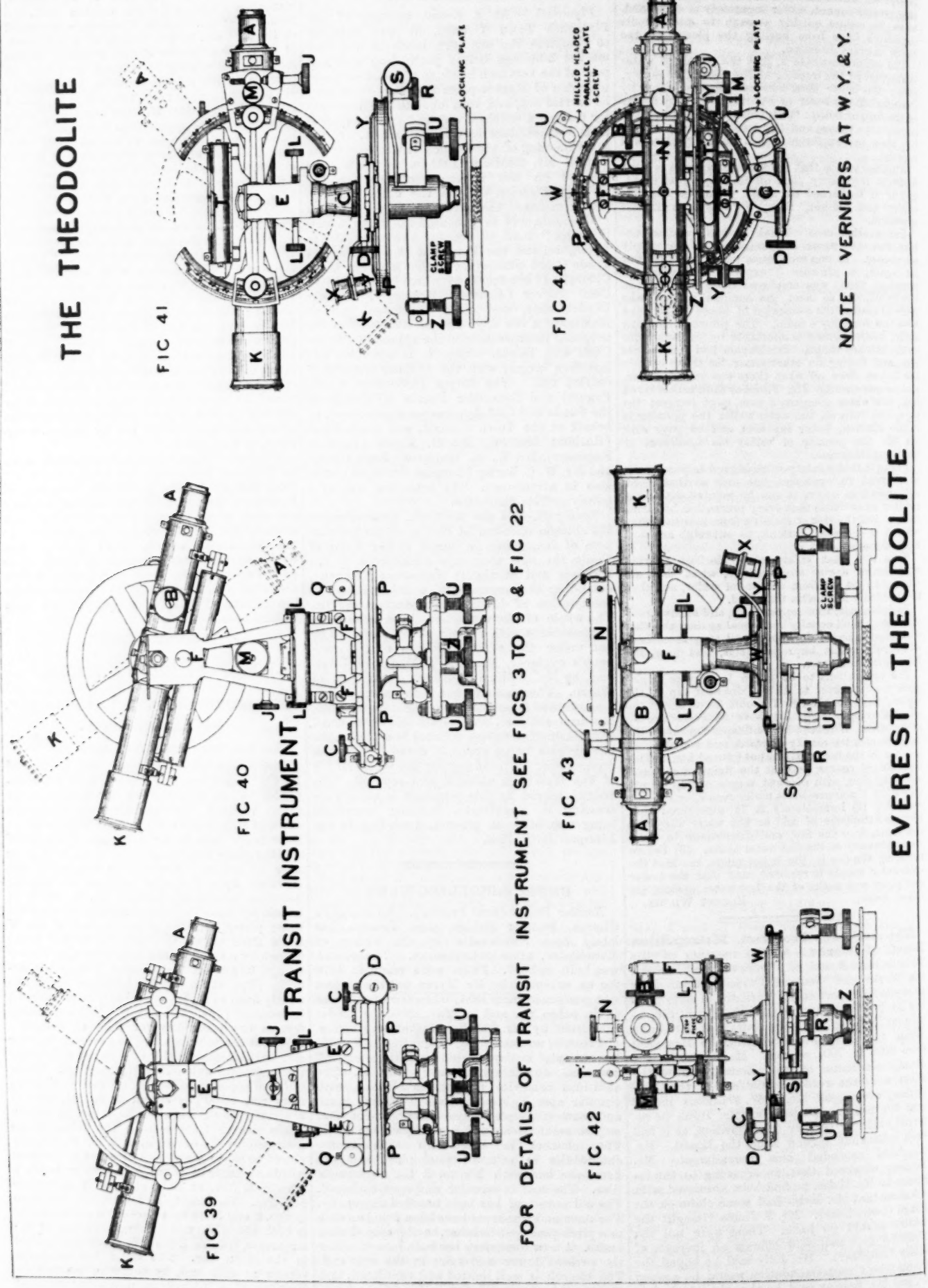
FIELD WORK AND INSTRUMENTS.—XIV.

Surveying Instruments.

IX.—THE THEODOLITE (*continued*).

IN a transit instrument, the horizontal axis forms the centre line of the trunnions attached to the telescope, as shown in fig. 4. The trunnions are shouldered down at their outer ends, and are connected at their inner ends to the telescope by means of a collar-piece fixed round the outer tube at or near its centre. The axis is supported and movable upon V-shaped sockets or angular bearings, technically termed Ys, in which it is held by movable clips, consisting of thin flat brass plates, attached to one branch of the V by a fixed screw, and secured to the other branch by a small milled-head screw, as shown in figs. 39 and 40. In Colonel Everest's theodolite (figs. 41 to 44) the telescope is permanently fixed to its horizontal axis as in a transit instrument (figs. 39 and 40). The supporting frames are made low for sake of compactness, but the telescope can be reversed end for end by unfastening the clip pieces and lifting the horizontal axis out of its bearings. There are two opposite sectors graduated in degrees from zero to 50°, as shown in fig. 41, instead of a complete vertical circle, as in figs. 39 and 40. These sectors traverse with the telescope, as indicated by the dotted lines in fig. 41, and are placed so as to allow the telescope to traverse within an angle of about 45° above or below a horizontal line, as in a plain or Y theodolite (fig. 35). The long spirit level which was seen in figs. 3 and 34 to be attached to the telescope in both the plain and the transit types of instruments, is in an Everest instrument attached to the index bar. The index bar carries a vernier at each end, by means of which subdivisions of a degree in measuring vertical angles can be recorded. Instead of the two spirit levels marked Q and T in figs. 22 and 38, there is only one spirit level, marked Q in fig. 42, which is fixed parallel to the horizontal axis of the telescope, as shown in fig. 44, the spirit level marked T′ in figs. 41 and 42 being substituted for the spirit level T in figs. 22 and 38.

In comparing the detail of these instruments the reader is recommended to study their illustration with the aid of a magnifying glass, as



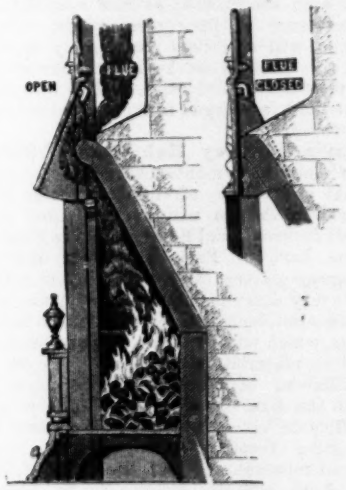
they are all reduced by photography from large size diagrams drawn to scale.

In place of the top plate or stage which carries the verniers in the plain and transit instruments (figs. 34 to 40), Colonel Everest's theodolite is supplied with four arms radiating horizontally from the inner vertical axis. Three of these arms are spaced equidistant to one another, and carry an index and vernier scale attached in positions shown in fig. 44, which are read by the aid of an independently traversing magnifier marked X. The four arms are connected to the vertical axis of the telescope so as to turn with it upon the lower plate or limb and thus to measure horizontal angles upon its graduated edge. The fourth arm carries the clamp and tangent screws marked C and D for fixing the telescope in any required position. A trough compass box similar to that shown in fig. 10 is fixed above the telescope in the position marked N in fig. 43. The instrument is mounted upon a three-screw combination of parallel plates, the feet of the elevating screws working in a chamfered depression in the lower plate in which they are held by turning a locking plate, as explained by figs. 15 to 20. It is necessary that the extremities or supports of the horizontal axis to the telescope should be precisely on a level with one another when the instrument is set up, otherwise the point of

intersection of the webs will not traverse in a true vertical plane. In a transit class of instrument reversal of the axis is an essential feature. To protect the transverse bubble Q from contact with the slide shade cover when the telescope is traversed with the shade or the object glass tube out as shown dotted in fig. 3, a small wire hook guard is fixed to the stage, as shown upon the left hand side of the spirit level Q in fig. 3.

THE "MARLBOROUGH" GRATE.

In our account of the Building Trades' Exhibition a fortnight ago, we briefly referred to a grate exhibited by Messrs. Steel & Garland, and bearing the above name, as "admirably embodying the main principles of construction and arrangement advocated by that indefatigable worker in the cause of fireplace reform, Mr. Pridgin Teale." We now give a section of the grate, which, as will be seen, is made with a fire-brick back sloping forwards towards the front. This fire-brick back effectively radiates the heat instead of its being lost up the chimney. The back becomes very hot and assists materially in the consumption of the smoke. The aperture into the chimney is small, allowing comparatively little heat to pass into the flue, and the aperture can be regulated at pleasure with the greatest ease, even when the fire is alight, by means of the patent adjustable canopy shown open in the section. This canopy can also be lifted



off without taking out any screws or other fastenings,—a point which is of very great convenience in fixing the grate or sweeping the flue. The fire-bars, instead of being heavy cast-iron horizontal bars, are thin wrought-iron vertical bars, which do not hide the fire from view, and allow a very much greater radiation of heat into the room. Under these bars is a solid screen or "Economiser," hiding the ashes and making the fire slow combustion by preventing a rush of cold air from constantly passing through the fire. The bottom grate has a very fine mesh, and the waste ashes are very small in quantity. It is asserted that the fire will burn for several hours without attention if left alone, and that it always keeps bright. From what we saw of its behaviour at the Building Trades' Exhibition we are disposed to think that this grate will come largely into use.

STAINED GLASS.

Elstow.—During the past few weeks Mr. Wigram, of this parish, has had two stained-glass windows placed in the east-end of this historic church, in memory of his father and mother. When the plain glass was taken out, the stonework of the windows, each of which consists of three lights, was completely removed, and entirely renewed from a design by Mr. T. G. Jackson, under whose supervision the restoration was accomplished six years ago. The subjects represented in the glass are, to the left, "The Adoration of the Wise Men," and on the right "The Ascension," and beneath each are the respective words, "In memory of Octavius Wigram, died in London, 20th May, 1878," and "In memory of Tabitha Wigram, died in London 1st October, 1863." The work has been designed and carried out by Messrs. Mayer & Co., of Munich and London; and the stonework has been executed by Messrs. Black Bros., of Bedford.

Manningham (*Bradford*).—The Church of St. Mark, at Manningham, near Bradford, has lately received a four-light window by Messrs. Mayer & Co., of Munich and London, in memory of Mr. F. W. Anderton, of Bolton Royd.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

2,566, Manufacturing Bricks and Tiles. P. Bawden.

The improved machine which is the subject of this patent is driven by horse or steam power, and grinds or pugs the clay or brick earth, fills the brickmoulds with clay, and also pushes the moulds out after striking the bricks, so that they leave the machine perfectly sanded all over. The construction is much the same as that of ordinary brick machines, but the special points of improvement are in the direction of compactness and strength.

5,371, Inlet Ventilators. J. A. Mackmeikan.

Upon the mouth of the inlet tube, where it opens into the apartment, the inventor fixes radiating plates dividing the mouth transversely into sections. These radiating plates are, preferably, arranged in sections and at right angles to each other, so that the opening of the lower end of the plates is considerably less than the upper end; they then spread out in a fan-like form. The distribution is equalised, and the valves or mouths of the tube which are covered with baffles of perforated material not so as to entirely stop but to slacken the draught when closed.

6,024, Closets. W. H. Bowers.

This invention relates to a filtering apparatus for such closets as are used near rivers or sewage mains. The filtration is accomplished by the use of wood, ashes, or charcoal, deflected or thrown over the soil. The sewage is then further filtered as it passes into a drained pit.

9,778, Upcurrent Ventilator. A. E. Black.

This invention relates to an upcast ventilator with the current controled by mica flaps or valves which hang down over the openings, but are raised when the upward current of air passes out. When, however, a cross-current or down draught is beating the effect is to close the mica valves, and thus prevent the smoke being drawn downward.

12,277, Window Sash Fasteners. J. G. Goodwin.

This invention consists simply of a screw bolt, one end of which fixes in a socket when the window is closed. It is turned as an ordinary screw by a milled head cast on it for the purpose.

25, Testing Pipes, Drains, &c. E. G. Banner.

This invention consists in enclosing a powerful and pungent material, such as peppermint, carbolic acid, &c., in capsules of glass or gelatine. These are then thrown into the drain and broken. This prevents the smell from previously hanging about the atmosphere or the clothes of the workman, and, in addition, leaves him quite free to perform his work.

643, Window Sashes and Frames. J. W. Cropper.

This invention consists in hanging the frame of the window so that the whole may be opened inwards. The sashes are hung in the frame in the ordinary manner, except that where possible weights are dispensed with.

NEW APPLICATIONS FOR PATENTS.

March 18.—4,077, E. Hirst, Hinges for Doors, &c.—4,079, J. Enright, Protection of Houses.—4,109, R. Haddan, Electrical Burglar Alarms.

March 19.—4,151, J. Robertson, Fireproof Floors and Ceilings.

March 21.—4,193, H. Stevenson, Horticultural Buildings.—4,194, W. Skinner, Water-closets.—4,204, W. Hayhurst, Cramps.—4,231, H. Lehmann, Wood Planing and Turning Machines.—4,242, M. Hoffmann, Artificial Majolica, &c.

March 22.—4,244, A. Tourgès, Frames for Portable Structures.—4,254 and 4,255, M. Syer, Syphon Water-waste Preventer.—4,261, J. Millar, Window Sashes.—4,285, A. Dresser, Heating Buildings, &c.—4 300, McKechnie and Wicks, Plumbers' Traps.—4,321, F. Tarseul, Door Locks.

March 23.—4,323, F. Smith, Door Springs and Checks.—4,327, C. Henderson, Construction of Chimneys inside Buildings.—4,340, H. Buchan, Water-closets.—4,367, A. Blanc, Draining Machines.

March 24.—4,404, J. Killey, Air Inlets for Drains.—4,417, J. Hill, Opening, Closing, and Fastening Sashes.—4,421, E. Dummer, Domestic Fire-grates or Stoves.—4,427, D. Olinger, Gate Hinge.

PROVISIONAL SPECIFICATIONS ACCEPTED.

15,678, H. Sulley, Glazed Pavement Lights.—291, E. Phillips, Automatic Saw-Sharpening Machine.—2,535, Harcourt and Shaw, Apparatus for Closing Doors.—2,590, E. Poole, Roofing Tiles.—2,725, D. Cheetham, Draught Preventer for Windows.—2,912, J. Barber, Stove Grates.—3,107, H. Hunt, Bath and Lavatory Fittings.—3,116, W. Clapham, Joiners' Clamps, &c.—3,118, T. Twyford, Water-closet Basins or Pans.—3,220, H. Wethered, Regulator for Water-closets.—3,299, G. Moss, Ventilating Apparatus.—2,736, A. Jones, Dies for Hip-and-Valley Tiles.—267, J. Gamble, Warming and Ventilating Houses, &c.—1,364, W. Farrell, Gauge for obtaining Lines, Angles, &c., in Working Mouldings on Stone.—1,492, Telfer & George, Combination Wood-working Machines.—2,337, Taylor & Davis, Attaching Door-knobs to Spindles.—2,513, Little & Hall, Timber Roofs.—2,742, Shaw & Chittick, Flooring or Roofing for Bridges, Warehouses, &c.—3,431, J. Duckett, Water-closets.—3,690, H. Owens, Rim Locks.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

5,031, R. Weaver, Water-closet Apparatus and Sanitary Appliances.—5,391, W. Baldwin, Waste-preventing Siphon Cistern for Flushing Closets, &c.—6,786, J. Thomas and Others, Galvanising Sheet Metal.—6,804, R. Hitchens, Plastering Compound.—6,817, J. Partington, Metal Doors and Frames for Buildings.—6,858, A. Boult, Heating Apartments.—6,945, J. Lamb, Flushing Tanks.—10,004, Reeves & Slatter, Indicator for Hotels, Factories, &c.—10,055, A. Andrews, Window and Door Fasteners.—2,712, H. Allison, Door Letter-box Indicators.—2,736, A. Jones, Dies for Hip-and-Valley Tiles.—6,020, R. Best, Gas Chandeliers and Pendants.—2,435, G. Thornton, Air-tight Packing for Doors and Windows.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MARCH 17.	
By BAXTER, PAYNE, & LEPPER.	
Bromley, College-road—Freehold stabling	£390
Two plots of freehold land	260
Madras Cottage, freehold	370
MARCH 19.	
By J. G. ROBINSON & SON.	
Wendon, Essex—Rose Cottage, copyhold	350
Saffron Walden—Market-row, freehold cottage	110
Lodge Farm house and grounds	405
Five plots of freehold land	140
MARCH 21.	
By PORTER & WATT.	
Camden-road—No. 196, 57 years, ground-rent 12*l.*	2,400
Haverstock Hill—8, Lismore-circus, 78 years, ground-rent 6*l.* 10*s.*	330
By T. DANN.	
Dartford—25 to 87 odd, Hythe-street, freehold	5,260
MARCH 22.	
By A. RICHARDS.	
Tottenham—1 to 5, Clark's-cottages, freehold	615
Commercial-road—Nos. 510 and 512; and 1 and 2, Ratcliffe-square, 84 years, ground-rent 35*l.*	890
Edmonton—176, Upper Fore-street, freehold	750
By C. ABERCROMBIE.	
Cricklewood—21, Ash-grove, 92 years, ground-rent 7*l.*	495
37 and 39, Elm-grove, 92 years, ground-rent 10*l.* 15*s.* 6*d.*	600
By BAYFIELD & HILL.	
Ealing—Cambridge House, 58 years, ground-rent 6*l.* 18*s.* 4*d.*	600
By ROBINSON & FISHER.	
Charing Cross—31 to 33, St. Martin's-street, 11 years, rent 210*l.*	200
Hadleigh, Essex—Potash Farm, and 3Ca. 3r. 30p., freehold	310
Dartmouth, near—The Sheplegh Court Estate of 475a. 3r. 28p., freehold	18,100
By H. RUTLEY.	
Hampstead-road—106, Stanhope-street, 34 years, ground-rent 18*l.*	400
By DEEKS & Co.	
Westbourne Park—65, Tavistock-crescent, 76 years, ground-rent 9*l.*	470
MARCH 23.	
By MESSRS. GRANT.	
Bayswater—14, Kensington Park-gardens, 63 years, ground-rent 33*l.* 3*s.*	2,800
Bermondsey—147, Lynton-road, 53 years, ground-rent 10*l.*	335
47 to 53 odd, Lynton-road, 42 years, ground-rent 13*l.* 18*s.*	1,310
MARCH 24.	
By NEWSON & HARDING.	
Dalston—8, 14, and 16, Blomfield-street, 50 years, ground-rent 2*l.*	890
Stoke Newington—337, Amherst-road, 79 years, ground-rent 6*l.* 10*s.*	410
Notting Hill—147, Lancaster-road, 63 years, ground-rent 4*l.* 6*s.* 8*d.*	390
By GLASIER & SONS.	
Bayswater—15 and 16, Westbourne-terrace, 55½ years, ground-rent 20*l.*	2,320
Fulham—25, Chesilton-road, 93 years, ground-rent 8*l.*	400
By C. C. & T. MOORE.	
Bow—62, St. Stephen's-road, freehold	540
Mile End—36, Grove-street, 54 years, ground-rent 4*l.* 1*s.*	415
60, Skidmore-street, freehold	325
Dalston—24, Marlborough-road, 58 years, no ground-rent	260
Poplar—6, Canton-street, 30 years, ground-rent 2*l.* 8*s.*	295
7 and 9, Chrisp-street, and 12 and 13, Woollett-street, 39 years, ground-rent 12*l.*	910
Walthamstow—23, Colebrook-road, 90 years, ground-rent 4*l.*	250
Blackmore, Essex—Three copyhold houses	279

By J. G. & A. PREVOST.

North Bow—46 and 48, Eglington-road, freehold ...	£615
Leytonstone-road — 14, Argyle-road, 91 years, ground-rent 5*l.* 15*s.*	300
Leyton-road, Tyndal-road—A plot of freehold land	45
Bethnal Green—Freehold ground-rents of 17*l.* a year	360
Limehouse—104 and 106, Maroon-street, 17 years, ground-rent 5*l.*; and 4, Thomas-street, 58 years, ground-rent 2*l.*	200

MARCH 25.

By BAKER & SONS.

Staines—Duncroft Cottage, with grounds, copyhold	980
Cricklewood—The Old Schoolhouse, freehold	360

By C. & H. WHITE.

Mitcham—1, 2, and 3, Willow-walk, freehold	1,650
A plot of freehold land	160
4 and 5, Willow-walk, freehold	190
Gray's-inn-road — Improved ground-rent of 34*l.* 12*s.*; and 9, Harrison-street, ground-rent 3*l.*, term 15 years	500
7, Seaford-street, 14 years, ground-rent 12*l.* 10*s.*	195
Brixton—An improved ground-rent of 20*l.*, term 14 years	180

By R. REID.

Haymarket—16, Great Windmill-street, freehold	5,440
Paddington—19, Howley-place, 59 years, ground-rent 15*l.*	380
Ealing, Castle Bar-road—Knoyle House, 71 years, ground-rent 10*l.* 13*s.* 5*d.*	730

MEETINGS.

SATURDAY, APRIL 2.

Architectural Association.—Visit to Lambeth Palace. 2·30 p.m.

St. Paul's Ecclesiological Society.—Visit to Lambeth Palace, under the guidance of Mr. J. P. Seddon. 3 and 4 p.m.

Royal Institution.—Lord Rayleigh on "Sound." 3 p.m.

Association of Public Sanitary Inspectors.—Dr. Alfred Carpenter, J.P., on "Theory and Practice as to Disinfection." 6 p.m.

MONDAY, APRIL 4.

Society of Engineers.—Mr. Edwin Ault on "The Shone Hydro-Pneumatic Sewerage System." 7·30 p.m.

Society of Arts (Cantor Lectures). — Professor W. C. Unwin on "Machines for Testing Materials, especially Iron and Steel." III. 8 p.m.

Clerks of Works' Association.—Annual Meeting. 7 p.m.

Victoria Institute.—8 p.m.

Leeds and Yorkshire Architectural Society. — Annual meeting.

TUESDAY, APRIL 5.

Institution of Civil Engineers.—Mr. E. A. Clowes on "Printing Machinery." 8 p.m.

Birmingham Architectural Association. — Mr. H. H. McConnal will read a paper entitled "Notes on a Tour in Germany." 7·30 p.m.

WEDNESDAY, APRIL 6.

Carpenters' Hall, London Wall (Free Lectures to Building Artisans).—Professor A. H. Church, M.A., on "Wood, its Chemistry, its Decay, and its Preservation." 8 p.m.

Parkes Museum of Hygiene.—Mr. J. Bailey Denton, M.Inst.C.E., on "Metropolitan Sewage Disposal." 8 p.m.

British Archæological Association.—(1) Dr. Hooppell on "Discoveries at Vinovia." (2) Mr. C. Lynam on "The White Ladies of Brewood." 8 p.m.

SATURDAY, APRIL 9.

Edinburgh Architectural Association.—Visit to Duntarvie Castle and Niddry Castle.

Miscellanea.

School Hygiene.—A correspondent sends us his own experience of the sanitary condition of private schools, which is, no doubt, shared by others who have directed attention to this subject. He sent his son to a private day-school, where the drainage and ventilation were defective, and an attack of gastric fever resulted in his removal to another school, where, again, the house was not free from unwholesome smells. A complaint to the schoolmaster was met with the request that the boy should be withdrawn. A third school was found, but this had the important disadvantage of being so constructed that the pupils were required to work in shadow while they faced the full glare of windows. Our correspondent pleads for some proper control over these institutions; the matter is, indeed, very much in his own hands and those of other parents. If schoolmasters found that the guardians of children required satisfactory evidence of the hygienic condition of the schools to which they propose to send their children, there is but little doubt the necessary improvements would be effected. It is not probable the Legislature would consider that school-houses should be dealt with differently from dwelling-houses; nor, indeed, if sanitary authorities were endowed with special powers for these institutions, can it be expected they would be adequately exercised. It is, therefore, desirable that efforts should be made to induce parents to recognise the importance to their children of health conditions, and we might suggest that schoolmasters would be consulting their own interests in meeting the reasonable requirements of those who entrust their children to their care.—*Lancet.*

The American Exhibition Buildings at Earl's Court, Kensington.—The works on the buildings of the American Exhibition of the Arts, Industries, Manufactures, and Products of the United States, which are being erected on a large area of land, nearly twenty-three acres in extent, between the Earl's Court and West Brompton stations of the Metropolitan District Railway, are being very actively proceeded with, upwards of one thousand artisans and labourers being at present engaged on the works. For the varied purposes of the Exhibition, several buildings, distinct from each other, are in course of erection. The main building is situated at the extreme western boundary of the site, running northwards in the direction of Earl's Court from its principal frontage at West Brompton, near the West Brompton station, and approached from Lillie Bridge-road, close to the locomotive works of the District Railway. This building is 1,230 ft. long and 120 ft. wide, covering an area of upwards of 125,000 ft. Its elevation in the Lillie Bridge-road is faced with Portland cement. The chief business offices in connexion with the exhibition are on the east and west sides of the frontage. Immediately to the west are separate buildings, one forming a dining-room, 250 ft. long and 90 ft. wide, and the other an art gallery, 160 ft. by 80 ft. The whole of these three buildings are fast approaching completion. The height of the main building to the apex of its angular roof, which is being covered in with corrugated iron and glass (the sides also being in corrugated iron), is upwards of 60 ft. The flooring is considerably advanced towards completion, and it is expected that this main section of the exhibition buildings will be ready for the reception of exhibits in about a fortnight. Amongst the numerous other structures which are in progress are several pavilions and sheds at different points on the ground, and the attractions of the exhibition will likewise include a theatre on the north-west side of the ground. On the north-east side, between four and five acres have been appropriated as an open air encampment, which is intended to be utilised as a hunting-ground, where scenes illustrative of the "wild West" and prairie life will be given. On the south side of the encampment an immense grand stand has been erected. The ground in front of the stand will be formed into a racecourse over a third of a mile in length. This encampment fills a triangular space, having on one side the West London Railway from West Brompton to Addison-road, and on the other sides of the triangle the District line from Earl's Court to Hammersmith, and the District branch from Earl's Court to West Brompton. The encampment, as well as the exhibition grounds generally, will be approached from Earl's Court station, in addition to the Lillie Bridge-road approach, by four bridges at different points on the District line. It may be added that a considerable portion of the space is being formed into colonnades, divided, in American fashion, into "First-street," and so on in succession up to "Tenth-street." The works and buildings have been designed by Mr. O'Driscoll, who is acting as engineer to the Exhibition Commissioners, and are being carried out by the Commissioners' own workmen.

Crane's Ventilating Warming Coils.—We have had an opportunity of seeing some of these coils in action, at the Tottenham-road Board Schools, Kingsland. They appear to do their work of supplying the rooms with warmed fresh air most efficiently, and even on a cold day (such as the one when our visit was made) rooms containing a large number of children are comfortably warm, but free from "stuffiness." Each coil consists of a series of upright columns, connected with top and bottom boxes, through which the water or steam circulates. Inside of each column is a 2 in. pipe with both ends open. An opening through the wall, next the heater, with air grating, is made to the under side to admit fresh air, which is caused to rise by the heat of the pipes through the inner tube, and being warmed on its way passes out of the top grating and thus enters the room. The room is thus supplied with clean warmed air. The apparatus is made by Mr. Robert Crane, of Stockwell Park-road. The coils are not unsightly, and need no casings or grilles.

The Æolus Waterspray Ventilating Company have removed to 124, High Holborn.

Mitis Iron.—The following particulars respecting the so-called mitis iron, the patent process for which was recently sold by M. Nordenfelt to an English Company, may be of interest. It was discovered by a Swedish engineer, Herr Wittenström, and has for a year been subjected to various trials at Messrs. Faustman & Östberg's Engineering Works, at Karlsvik, near Stockholm. Mitis iron castings, the name being derived from the Latin word *mitis* "weak," "soft," is produced by the direct smelting of soft forged bar-iron, and possesses all the qualities of the latter. According to experiments carried out at the testing establishments of the *Järnkontor* (Iron Board), it has shown an absolute tensile strength of 1-3rd kilogrammes per square millimètre (fourteen tons per square inch), with a final elongation of 15 per cent. A variety of articles have been most successfully manufactured from this kind of iron at Karlsvik, as, for instance, carriage springs, tools of all kinds, agricultural implements, and even soles for boots, which are to be coated with india-rubber, ordered by an English firm for a South American army. The cost of articles manufactured from this kind of iron is about 50 per cent. higher than that of such made from ordinary cast-iron, but they are much cheaper than hand-forged goods, and in comparison with the former articles of mitis iron show far greater strength and toughness, and with the latter a better finish. Generally very little filing of the edges of mitis cast goods is required, and at Eskilstuna,—the Sheffield of Sweden,—mitis iron has even been used successfully as raw material in the manufacture of finer steel goods. The new method will doubtless be largely introduced into the Swedish works in preference to the old methods of reduction, and is also sure to affect the hand-forged iron and steel industry of that country.

Paris Railway Exhibition, 1887.—As has already been mentioned in our columns, the fiftieth anniversary of the introduction of railways into France will be celebrated by the Grand International Railway Jubilee Exhibition, to be held in Paris this year, under the patronage of the Ministry. We are informed that every description of railway plant will be represented, including the most recent improvements, which will illustrate, by comparison with obsolete material, the railway progress made in different countries. The grounds upon which the Exhibition will be held form part of the Bois de Vincennes, and will contain many attractive features, among which may be noticed representation of the Ports of Havre, New York, and Rio Janeiro, to be erected on the Lac Daumesnil, which is within the grounds. The latter are three miles and a half in circumference, and will be girt by a line illustrating the railway systems of different countries, a special feature being the stations and villages typical of each nationality, which will be placed along the line.

An Iron House.—A house built of iron has been sent from Hamburg to the Cameroons. It is stated to be very warm in the summer, and, therefore, cannot be said to be very suitable for hot climates; but, on the other hand, such iron houses are easily taken to pieces and put up where required, hence their advantage. Everything is done to reduce the heat, the walls of the upper stories being double, and the intervening space filled with a material bad for conducting heat, whilst the walls are coated with clay inside. The roof is covered with mould outside, which again in the hot season is covered with straw. A verandah runs, in Swiss style, all round the building, and the stairs to the upper stories are outside the house. The cost is very low, being only 40 marks per square mètre of inhabited area.

The Sanitary Registration of Buildings Bill.—The Surveyors' Institution, the Association of Municipal and Sanitary Engineers and Surveyors, and the London Sanitary Protection Association, have appointed representatives to attend the Conference of Architectural Engineering, and Medical Institutions on the Sanitary Registration of Buildings Bill, 1887.

Drying Bricks.—We hear that Mr. James Brown, of Cannon-street, whose face and ornamental bricks are well known to many architects and builders, is about to put up a new brick drier, on the system of the Universal Cool Air Drying Company (Limited), whose process as applied to the drying of timber was described in our pages in October last.

A Useful Desk-book.—"The Architect and Contractor's Compendium, Specialist's Directory and Diary" (London: James Sears & Sons, Crane-court, Fleet-street) has lately been issued, under the editorship of Mr. John E. Sears, A.R.I.B.A. It is a very useful and handy publication for architects, builders, clerks of works, and foremen. It contains, besides an office diary, a synopsis of Building Acts and By-laws, legal and general information, and tables and memoranda. Without vouching for the accuracy of all this matter, we may say that, so far as we have been able to put it to the test, we have found it to be trustworthy. One important feature of the work is a directory of building materials, manufactures, and specialities, classified and indexed. This will be not the least useful part of the work, which is clearly printed and indexed. We hear that the second issue is now in preparation for publication in October next.

Hydraulic Lifts for the Colonies.—Messrs. R. Waygood & Co. are now making the hydraulic lifting plant for Messrs. W. Gardiner & Co.'s Sydney premises. The plant will consist of one of Waygood's patent hydraulic balanced passenger lifts, three goods lifts, two 10-cwt. hoists, accumulator, pumps, and two Otto gas engines for working the latter. The same firm of engineers has just completed fixing a hydraulic passenger lift for the Victoria Coffee Palace Company, Melbourne, and are now erecting one of their hydraulic balanced passenger-lifts in Brisbane, Queensland.

The Excavations at Delphi.—The *Daily News* correspondent at Athens telegraphs:—The Chamber has ratified the convention with France respecting the excavations at Delphi. The terms of the convention are most liberal to Greece. All the objects excavated remain in the country. The French Government reserves for a definite period the sole right of publishing the inscriptions, photographs, &c. The modern village of Castri being built on the site to be excavated, the French Government agrees to compensate the inhabitants for the land or houses required.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	9 0 0	14 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch ,, ...	2 0 0	3 10 0
Elm ,, ...	3 10 0	4 10 0
Fir, Dantsic, &c.	1 10 0	4 0 0
Oak ,, ...	2 10 0	4 10 0
Canada	3 0 0	6 0 0
Pine, Canada red	2 0 0	3 10 0
,, yellow	2 5 0	4 0 0
Lath, Dantsic ....fathom	3 0 0	5 0 0
St. Petersburg	4 0 0	5 10 0
Wainscot, Riga ....log	2 15 0	4 0 0
,, Odessa, crown	2 15 0	3 0 0
Deals, Finland, 2nd and 1st...std.	7 0 0	8 0 0
100		
,, 4th and 3rd	5 10 0	6 10 0
Riga	5 10 0	7 0 0
St. Petersburg, 1st yellow	8 10 0	14 0 0
,, 2nd ,, ...	7 0 0	8 0 0
,, white	6 0 0	9 0 0
Swedish	6 0 0	15 0 0
White Sea	7 0 0	16 10 0
Canada, Pine, 1st	17 0 0	25 0 0
,, ,, 2nd	11 0 0	16 0 0
,, ,, 3rd, &c.	6 0 0	9 0 0
,, Spruce, 1st	8 0 0	10 0 0
,, ,, 3rd and 2nd	5 0 0	7 0 0
New Brunswick, &c.	5 0 0	7 0 0
Battens, all kinds	4 0 0	11 0 0
Flooring Boards, sq. 1 in., prepared, First	0 8 0	0 11 6
Second	0 6 6	0 7 6
Other qualities	0 5 0	0 6 0
Cedar, Cuba ....foot	0 0 3	0 0 3½
Honduras, &c.	0 0 2½	0 0 3½
Australian	0 0 2	0 0 3
Mahogany, Cuba	0 0 4	0 0 7
St. Domingo, cargo average	0 0 4	0 0 6
Mahogany, Mexican, cargo av.	0 0 3½	0 0 4½
Tobasco ,, ...	0 0 4	0 0 6
Honduras ,, ...	0 0 4	0 0 6
Maple, Bird's-eye	0 0 6	0 0 8
Rose, Rio ....ton	7 0 0	10 0 0
Bahia	6 0 0	10 0 0
Box, Turkey ....ton	5 0 0	15 0 0
Satin, St. Domingo ....foot	0 0 5	0 0 10
Porto Rico	0 0 6	0 0 10
Walnut, Italian	0 0 4	0 0 5

METALS.		
IRON—Bar, Welsh, in London...ton	4 7 6	4 15 0
,, ,, in Wales	4 2 6	4 7 6
,, Staffordshire, London	5 10 0	6 0 0
Sheets, single, in London	6 15 0	8 10 0
Hoops ,, ...	6 0 0	7 0 0
Nail-rods ,, ...	5 15 0	6 10 0
COPPER—		
British, cake and ingot ....ton	43 0 0	43 10 0
Best selected	44 0 0	44 10 0
Sheets, strong....	50 0 0	51 0 0
Chili, bars	39 12 6	40 0 0

METALS (*continued*).	£. s. d.	£. s. d.
YELLOW METAL ....lb.	0 0 4 1/16	0 0 4½
LEAD—		
Pig, Spanish ....ton	12 12 6	0 0 0
English, common brands....	12 17 6	0 0 0
Sheet, English	13 17 6	14 2 6
SPELTER—		
Silesian, special ....ton	14 2 6	0 0 0
Ordinary brands....	14 0 0	0 0 0
TIN—		
Straits....ton	102 5 0	0 0 0
Australian	102 5 0	0 0 0
English ingots	105 10 0	0 0 0

OILS.	£. s. d.	£. s. d.
Linseed ....ton	20 0 0	20 2 6
Cocoanut, Cochin	33 0 0	36 0 0
Ceylon	25 10 0	0 0 0
Palm, Lagos	22 0 0	0 0 0
Rapeseed, English pale	22 5 0	22 10 0
,, brown	20 15 0	21 0 0
Cottonseed, refined	18 0 0	19 10 0
Tallow and Oleine	25 0 0	45 0 0
Lubricating, U.S.	5 0 0	6 10 0
,, refined	5 0 0	12 0 0
TURPENTINE—		
American, in casks ....cwt.	1 8 0	0 0 0
TAR—		
Stockholm ....barrel	0 15 0	0 15 6
Archangel	0 12 6	0 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Jubilee Clock Tower, Margate	The Committee....	Not stated	Not stated...	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Broken Granite	Ramsey Local Board ...	*Official*	April 2nd	ii.
Broken Granite	Hackney Board of Wks	J. Lovegrove....	April 6th	ii.
Repair to Parapet Walls, &c., of Board Room	St. Olave's Union....	H. Saxon Snell & Son...	April 7th	ii.
Erection of Billiard-Room, &c., to Institute..	Battersea Liberal Club	....	do.	xxii.
Ladies' Swimming Bath	Leicester Corporation	J. Gordon	do.	ii.
Alterations and Additions to Town Hall.....	Grimsby Town Council	E. W. Farebrother.....	April 11th	ii.
Erection of Board Schools	Grays Thurrock Schl Bd.	G. Waymouth	April 12th	xxii.
Making-up and Paving Road	Wandsworth Bd. of Wks	*Official*	do.	xxii.
Sewage Works, &c.	Lowestoft Town Council	F. C. Stileman	do.	ii.
Rebuilding "New Market" House, Rochester	Messrs. Woodhams & Co	W. Banks	do.	ii.
Drainage Works....	Reigate Union	E. Larmer	do.	ii.
Cast-Iron Water Mains	Hastings R.S A.	Jeffery & Skiller	April 13th	ii.
Erection of Baths, Bournemouth	The Proprietors	J. Pollard	April 14th	ii.
Repairs to Hospital Steward's House.....	Met. Asylums Board ...	A. & C. Harston	April 16th	ii.
Road Materials	Tonbridge Highway Bd.	*Official*	do.	ii.
Roads and Sewers, &c....	Southborough Local Bd.	W. Harmer	April 19th	ii.
Wrought-Iron Hurdles	Met. Board of Works...	*Official*	do.	i.
Tar Paving	do.	do.	do.	i.
Restoration of Church, Clifford....	The Committee.....	Ewan Christian.....	April 20th	xxii.
Removal of Dust....	St. Giles's, Camberwell	*Official*	do.	xxii.
Removal of Street Refuse by Barges	do.	do.	do.	xxi[2].
Polesworth Waterworks	Atherstone R. S. A.....	B. Latham	April 25th	ii.
Construction of Aqueduct	Manchester Corporation	G. H. Hill	April 30th	ii.
Detached Villa, Ashford	.....	— Fitt.....	Not stated...	xxii.
Concert Hall, &c., Bethnal Green	.....	W. Batten	do.	xxii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Building Inspectors	West Ham Cor.	3*l.* per week	April 5th	xix.
Clerk of Works	Kingston Union	do.	April 6th	xx.
Inspector of Nuisances	New Windsor U. S. A.	100*l.*	April 12th	xix.

TENDERS.

BRIXTON.—For the erection of new parochial rooms, St. Jude's, East Brixton. Mr. Edmund Walter Wimperis, architect, Lambert-road, Brixton:—

Andrew & Nanson....	£2,477 0 0
Riddick & Sons	2,452 10 6
Maxwell Bros.	2,290 0 0
Peacock Bros.	2,257 0 0
Candler	2,200 0 0
Palmer....	2,130 0 0
Prestige & Co.	2,081 0 0
Howell & Son....	1,922 0 0

CHELSEA.—For the enlargement of the Sherbrooke-road School, Chelsea, by 400 places, for the School Board for London. Mr. T. J. Bailey, architect:—

A. G. Allard	£4,323 5 9
Norris & Luke	4,096 0 0
L. C. Roper	3,881 0 0
Stimpson & Co....	3,856 0 0
J. T. Chappell	3,764 0 0
J. Holloway	3,661 0 0
Priestley & Gurney	3,607 0 0
S. J. Jerrard	3,473 0 0
C. Wall	3,409 0 0
H. L. Holloway	3,395 0 0
W. Johnson*	3,379 0 0

* Recommended by the Works Committee for acceptance.

CHELSEA.—For alterations to shop front at 16, King's-road, Chelsea, for Messrs. Lester & Co. Mr. J. W. Stevens, architect:—

Salter	£108 4 0
Sage & Co....	98 0 0
Yardley & Sons (accepted)	97 0 0

CHELSEA.—For the erection of Chelsea Conservative Club. Messrs. Karslake & Mortimer, architects. Messrs. Hunt & Steward, surveyors:—

Adamson	£4,945 0 0
Higgs & Hill	4,580 0 0
Peto Bros.	4,468 0 0
Lidstone	4,380 0 0
Lawrence & Sons	4,370 0 0
Prestige & Co. (accepted)	4,164 0 0

CHILWORTH (Hants).—For the erection of a new vicarage at Chilworth, Hants, for the Rev. E. T. Hoare. Mr. Harold A. Kinder, architect, Lawrence Pountney Hill. Quantities by Alfred Howard, Martin's-lane:—

G. & J. Waterman, Watford	£2,329 0 0
John Allen & Sons, Kilburn	2,341 0 0
Geo. Wheeler, Romsey (too late) ...	2,250 0 0
J. M. Goodwine & Clack, Kilburn ...	2,200 0 0
Brinton & Bone, Southampton	2,200 0 0
Thomas Ware, Nursling	2,149 0 0
Tompsett & Kingham, Farnham	2,015 0 0
Wilkes & Co., London	1,950 0 0

HORNCASTLE (Lincolnshire).—For the formation of roads and sewers, Woodhall Spa, near Horncastle. Mr. R. Adolphus Came, surveyor, London. Quantities supplied:—

Bell	£6,790 8 0
H. Turner	2,453 0 0
Bradley	2,092 16 7
Pattison	1,891 0 0
Hensman	1,730 13 9
Kendall, London (accepted)....	1,702 11 6

HURSTPIERPOINT (Sussex).—For the erection of business premises, for Mr. George Jupp. Mr. Valentine Hollands, architect, Hassocks:—

F. Wood, Ditchling	£1,164 0 0
S. Norman, Burgess Hill	1,135 0 0
W. Downer, Burgess Hill (accepted)	937 0 0

KEW.—For the construction of a new road and sewers on the Kew Gardens Station Estate, for the Southwark Freehold Land and House Property Association. Mr. W. A. Curnock, surveyor, Moorgate-street:—

G. Osenton....	£1,538 0 0
A. T. Catley	1,230 0 0
T. J. B. Marshall....	1,191 0 0
G. Felton	1,169 0 0
W. Harris	1,073 0 0
Richard Mayo	1,065 0 0
W. Carter	1,043 0 0
James Young	1,032 0 0
J. Pizzey....	967 0 0
Peill & Sons (accepted)....	896 0 0

LEIGHTON BUZZARD.—For stabling, &c., to Golden Bell Inn, Leighton Buzzard, for the Trustees of Duncombe's Charity. Mr. Frederick Gotto, architect, Leighton Buzzard:—

Frederick Adams, Leighton Buzzard	£128	0	0
Thomas Underwood, Leighton Buzzard	115	5	10
George Andrew, Leighton Buzzard	110	0	0
T. P. Webb, Leighton Buzzard	110	0	0
Albert Dawson, Leighton Buzzard	108	10	0
Henry Edwards, Egginton	105	0	0
Amos Miles, Heath	104	17	6
David Cook & Sons, Leighton Buzzard	98	10	0
Wm. Muccleston, Leighton Buzzard	95	0	0
James Futt & Sons, Leighton Buzzard	92	7	6

LONDON.—For additional new business premises, Whitechapel-road, for Messrs Thomas Smith & Son, varnish and colour manufacturers. Mr. Zephaniah King, architect. Quantities by Mr. James Schofield:—

John T. Chappell	£6,676	0	0
Alfred Bush	6,551	0	0
Dove Bros.	6,350	0	0
Ashby Bros.	6,170	0	0
Colls & Son	5,995	0	0
E. Lawrence & Sons	5,975	0	0
James Morter & Son	5,963	0	0
Holloway Bros.	5,962	0	0
Rider & Son	5,958	0	0
Ashby & Horner	5,940	0	0
Higgs & Hill	5,940	0	0
Christopher Forrest	5,875	0	0

LONDON.—For gas fittings at the Green Man public house, Euston-road, for Mr. J. T. Smith:—

Stroud & Co.	£235	0	0
Buckly & Beach	230	0	0
Biggs & Co.	205	0	0
W. Winn	169	15	0

LONDON.—For rebuilding No. 27, Great Castle-street, for Mr. J. A. Michell. Mr. W. J. Miller, architect, Margaret-street:—

Fairchild	£1,799	0	0
Greenwood	1,781	0	0
Patman & Fotheringham	1,757	0	0
Simpson & Son	1,700	0	0
Oldrey & Co.	1,697	0	0
Manning	1,685	0	0
Ryder & Hunt	1,685	0	0
W. Downs	1,639	0	0

LONDON.—For rebuilding No. 66, Hatton-garden, for Messrs. Francesti & Santamaria. Mr. John W. Simpson, architect, New Inn, Strand. Quantities by Messrs. Evans & Deacon:—

Name.	£. s.	A* £. s. d.	B† £. s. d.	Time, weeks
Foster & Dicksee	3,485 0	220 0 0	82 0 0	13
Hill Bros.	3,190 0	188 17 3	86 3 6	13
C. Dearing & Son	3,114 10	189 12 6	91 2 6	20
Jno. Grover & Son	3, 97 0	181 0 0	65 0 0	20
J. H. Johnson	3,056 0	163 0 0	112 0 0	18
Jno. T. Chappell	2,944 0	170 0 0	98 0 0	12
Mark Manley	2,933 0	193 0 0	79 0 0	20
Killby & Gayford	2,870 0	170 0 0	99 0 0	—
F. & H. F. Higgs‡	2,798 0	166 0 0	101 10 0	12

* Alterations to present building.
† Extra for glazed bricks and tongued flooring.
‡ Withdrawn.

LONDON.—For decorating, &c., 104, 106, and 108, Oxford-street, for Messrs. Wheaton & Bennett:—

A. E. Grimes (accepted)	£372	10	0

LONDON.—For decorating chancel, nave, and nave roof of St. James' Church, Kennington Park, for the Vicar and Churchwardens:—

Marchant, Lady Somerset-road*	£105	10	0

* Accepted.

ONGAR (Essex).—For sinking and building new swimming-bath, 50 ft. by 18 ft., with pavilion over all, and dressing-rooms, at the Grammar School, Ongar, Essex, for Dr. W. C. Clark:—

J. Marks, Crouch End (accepted)	£270	7	6

PIRBRIGHT (Sussex).—For alterations to cottage residence, Pirbright, near Brookwood, Sussex, for Mr. C. J. Halsey, J.P. Messrs. Peak, Lunn, & Peak, architects, Guildford:—

Martin, Wells, & Co., Aldershot	£865	0	0
Mitchell Bros., Shalford	813	0	0
Harris, Woking	808	17	0
Kingerlee, Oxford	791	10	0
Leslie & Knight	784	0	0
Bottrill, Reading	748	0	0

ST. LEONARDS-ON-SEA.—For rebuilding premises, London-road, for Mr. N. J. Vaughan. Mr. Philip Henry Tree, architect, St. Leonards. Quantities by architect:—

Charles Hughes	£2,260	0	0
P. Jenkins	2,200	0	0
Henry E. Cruttenden	2,187	0	0
Eldridge & Cruttenden (accepted)	2,124	0	0

[All of St. Leonard's-on-Sea.]

ST. LEONARD'S-ON-SEA.—For rebuilding Wesleyan Chapel, Hollington. Mr. Philip Henry Tree, architect. Quantities by architect as reduced:—

P. Jenkins, St. Leonard's	£1,140	0	0
David H. Snow, Hastings	1,100	0	0
Henry E. Cruttenden St. Leonard's	1,020	0	0
F. Elliott, Hollington	913	0	0

SOUTHSEA.—For alterations, additions, painting, and decoration, and the erection of new class rooms, &c., at the Victoria Wesleyan Chapel, Chichester-road, Southsea. Mr. A. E. J. Guy, architect, Southsea. Quantities by Mr. James W. Stroud, Portsea:—

B. Pryer	£983	18	0
D. W. Lewis	955	0	0
H. Jones	931	0	0
T. P. Hall	890	0	0
W. Learmouth	867	0	0
J. H. Corke	858	0	0
F. Ellis	850	0	0
C. Dye	840	0	0
J. Crockerell	825	0	0
G. Pittis	795	0	0
Messrs. Scammell & Dowdell, Wingfield-street, Landport, Portsmouth*	757	0	0
R. Stokes	733	0	0

* Accepted.

SUSSEX.—For new stables at Gravetye Manor, Sussex, for Mr. W. Robinson. Mr. W. Simmons, architect, Long Acre:—

M. Gentry, London	£2,485	0	0
John Bottrill, Reading	2,295	0	0
Longley, Crawley	2,188	0	0

TOOTING.—For rebuilding the Plough Inn, Tooting, for Mr. J. E. Smith. Messrs. Wylson & Long, architects, King William-street, Strand:—

Ward & Lamble	£1,875	0	0
Walker	1,849	0	0
Oldrey & Co.	1,765	0	0
Patman & Fotheringham	1,727	0	0

*** **NEXT WEEK.**—As we go to Press a day earlier next week, all lists of Tenders for insertion in the *Builder* for April 9th must reach us **not later than 12 noon on WEDNESDAY next, April 6th.**

FIRE BRICKS.

BEST STOURBRIDGE FIRE BRICKS, and Cement Fire Clay, Gas Retorts, Muffles, &c. Fire Bricks and Blocks for the Highest Heats, for Iron Blast Furnaces, Forge, Rolling, Puddling, and Steel Furnaces, Flint Glass Furnaces, Roasting and Refining Furnaces, Chemical Works, Coke Ovens, &c. Boiler Seating Blocks, Fine Covers, Locomotive Bricks, Tuyeres, Steel Runners, Grate Backs. Special Sizes and Shapes made to Engineers' Drawings.
Prices quoted to any Port or Railway Station.
London Agents:—
R. CULL & SON, *Palmerston-buildings, E.C.*

GLAZED BRICKS.

OATES & GREEN, HALIFAX.
GLAZED BRICKS (White and Coloured), Special Salt-glazed Bricks Sanitary Tubes, Glazed Earthernware Sinks, Cattle, Sheep, and Pig Troughs, Horse Mangers, Patent Automatic Trough Closet, Patent Flush Tank. Ventilating Bricks, Patent Ventilating Gullies and Traps, Patent Chimney Pots for Down Draughts.
Six Prize Medals. Copies of Testimonials sent if required.
London Agents:—
R. CULL & SON, Palmerston-buildings, E.C.

BLUE BRICKS.

THE KETLEY BRICK COMPANY, KINGSWINFORD Staffordshire. Manufacturers of Blue Bricks.
London Agents:—
R. CULL & SON, Palmerston-buildings, E.C.

DRAIN PIPES.

Lime, Cement, Bricks, Slates, Laths, Hair, Plaster, Wall Copings, Channel Bricks, Blue and Red Ridges. Red Plain Tiles and Pan Tiles, Closet Pans and Traps. Bends, Junctions, &c. all sizes. Chimney Pots, Red and White. PRICES on APPLICATION.
R. CULL & SON'S Stores, Railway Arches, London-street, Bethnal Green Station, E.
Chief Office:—72, Palmerston-buildings, Old Broad-street, E.C

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

W. T. (arrived too late)—B. B.—P. & Sons—F. P.—J. A. J.—M. L.—F. C.—H. R. G. and E. F. (we have expressed on public grounds our opinion on what we regard as little short of a professional scandal; and there the matter may rest).—J. W. T. & Sons (too small).—R. B. & S. (shall have consideration).—S. E. (omitted for want of space at the time; cannot now return to the subject).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

CORSHAM DOWN. | FARLEIGH DOWN.

BOX GROUND. COMBE DOWN. WESTWOOD GROUND.

RANDELL, SAUNDERS, & CO., LD., CORSHAM, WILTS.

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS, BOX, WILTS. [ADVT.

Doulting Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Doulting Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMS, No. 16, Craven-street, Strand, W.C. [ADVT.

Doulting Free Stone HAM HILL STONE, BLUE LIAS LIME (Ground or Lump), For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, Stoke-under-Ham, Ilminster. [ADVT.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [ADVT.

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [ADVT.

MICHELMORE & REAP,
Manufacturers of
CHARLES COLLINGE'S PATENT.
COLLINGE'S PATENT HINGES, LEVER, SCREW, & BARREL BOLTS,
Self-Acting "FALL DOWN" GATE STOPS, and IMPROVED GATE FITTINGS of every Description
36A, BOROUGH ROAD, LONDON S.E.,
DISCOUNT TO BUILDERS.

BRABY'S PATENT GLAZING.

GLASS SET FREE,

ALLOWING EXPANSION AND CONTRACTION, AND PRECLUDING BREAKAGE.

ABSOLUTELY WATERTIGHT. PAINTING AND PUTTY SUPERSEDED.

OVER THREE MILLION FEET FIXED.

DRAWINGS AND PRICES ON APPLICATION.

- MODELS AND SECTIONS ON VIEW. -

LONDON: 352 to 364, EUSTON ROAD.
LIVERPOOL: 6 and 8, HATTON GARDEN.
GLASGOW: 335, ARGYLE STREET.